MARCH, 1958

Commercial Fertilizer

and PLANT FOOD INDUSTRY

Tips to Help You Speed Production

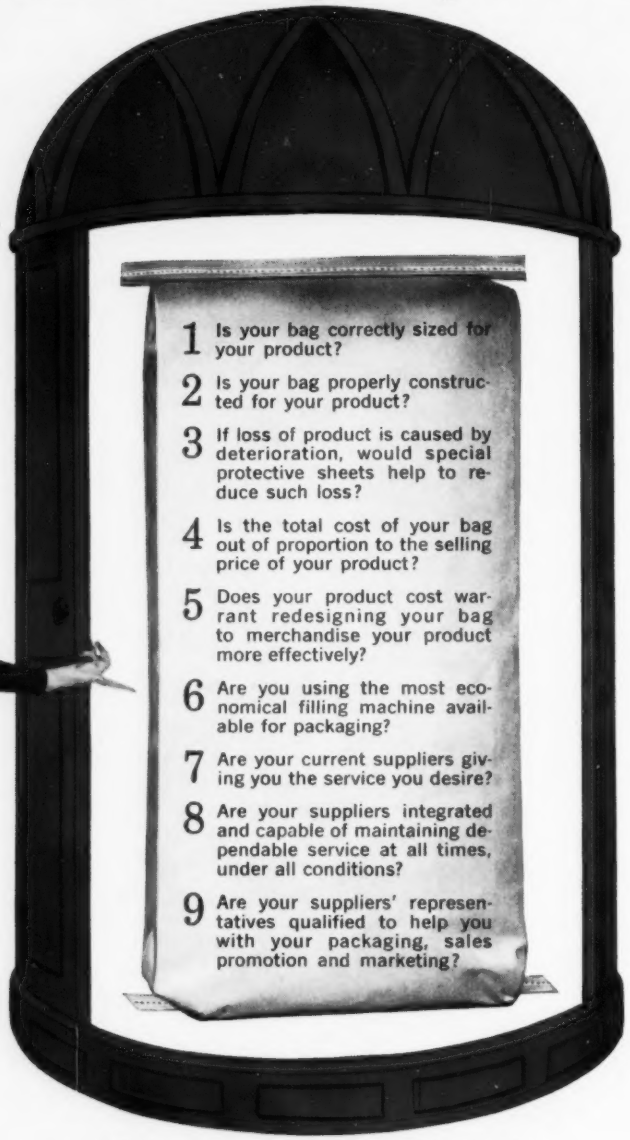
SEE PAGE 19

Advertisement of NITROGEN DIVISION, ALLIED CHEMICAL

QUIZ

For Multiwall Bag Buyers

"How Does Your Packaging Operation Rate?"


1 Is your bag correctly sized for your product?
2 Is your bag properly constructed for your product?
3 If loss of product is caused by deterioration, would special protective sheets help to reduce such loss?
4 Is the total cost of your bag out of proportion to the selling price of your product?
5 Does your product cost warrant redesigning your bag to merchandise your product more effectively?
6 Are you using the most economical filling machine available for packaging?
7 Are your current suppliers giving you the service you desire?
8 Are your suppliers integrated and capable of maintaining dependable service at all times, under all conditions?
9 Are your suppliers' representatives qualified to help you with your packaging, sales promotion and marketing?

Perhaps we may be able to help you to arrive at the right answers in order to achieve higher production at lower costs.

KRAFT BAG CORPORATION

Gilman Paper Company Subsidiary

630 Fifth Avenue, New York 20, N. Y.
Daily News Bldg., Chicago 6, Ill.

Plants at St. Marys, Ga. and Gilman, Vt.

Sales Agents for The **Kraftpacker**
Open Mouth Bag Filling Machine

Gilman PAPER CO.
* St. Marys Kraft Corp.
* Gummed Tape Div.
* The Gilmanized Corp.
* Kraft Bag Corp.

☐ O.K. Kraft...Help me to answer your Quiz. Please have representative call. CF

COMPANY_____

ADDRESS_____ ZONE____ STATE_____

CITY_____

PRODUCT MFD_____

NAME_____

For QUALITY that SHOWS

Nutronite

(Smirow)

..and quality you can *talk* about!

YOU CAN BAG NUTRONITE FOR LAWNS

Bag Nutronite to fill out your line of lawn and garden fertilizers. Golf courses use large quantities, too. For information on this profitable market for an all organic fertilizer write Smith-Rowland Co., Norfolk, Va.

Nutronite (formerly Smirow) adds to the selling power of your mixed fertilizers. Plainly visible Nutronite assures your customers of added growth and profits . . . brings back satisfied customers year after year.

Nutronite is the 100 percent natural organic addition to mixed fertilizers. Its nitrogen is highly water insoluble and 90% available—for that all-season effect on plant growth.

Nutrition + Nitrogen = Nutronite

Let us figure the cost of Nutronite delivered to your plant.

SMITH NUTRONITE ROWLAND

SMITH-ROWLAND CO.

P. O. Box 1219, Norfolk 1, Va.

A DIVISION OF SMITH-DOUGLASS COMPANY, INCORPORATED

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and PLANT FOOD INDUSTRY

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Commenting Freely

by BRUCE MORAN

People come up with interesting comments on agriculture: A Missouri soils specialist says the size of a farm is not how many acres, but what it produces. A Maryland foods man says it is income per man hour. It depends somewhat on your point of view which of these is correct.

The production of a farm these days can make it a problem child—because farm economists predict continued farm surplus, despite needs of a population, rising 20% by 1965, 50% by 1975. So it is of continuing importance that agribusiness methods replace old-style hit-or-miss farming.

The small farm has become a social rather than an economic problem. It is soon to be virtually extinct as a factor in sound agriculture. The business-managed farm must be our permanent source of products of the soil. And when this takes place the subsidy problem will have solved itself, as will the problem of the overhanging "Sword of Damocles" crop.

Not to mention the credit problem which besets the fertilizer manufacturer and his dealers!

THE MAN WITH THE MULTIWALL PLAN

UNION
PACKAGING SPECIALIST
J. R. GARMON

takes 40,000 lbs. off a packer's shoulders

Lifting twenty tons of filled bags a day is a lot of labor. It's inefficient, too, as a large chemicals producer learned during a recent survey of his Multiwall operation made by Union Packaging Specialist J. R. Garmon.

Garmon suggested a new system of *sliding* the customer's bags from the check-weigh scale to the bag flattener. This would not only relieve packer fatigue of manually lifting a 40,000 lb. bag load each day, but also assure full-capacity, full-time operation of the bagging equipment.

Union Multiwall Recommendations are based on this 5-star Packaging Efficiency Plan

- DESIGN
- EQUIPMENT
- CONSTRUCTION
- SPECIFICATION CONTROL
- PLANT SURVEY

Another recommended economy tip: redesign style, proportion, and construction of existing multiwall bags. This will result in annual savings of $1400 to $8000 for each 450 M of the various size bags used.

Such savings are not unusual when Union's 5-Star Packaging Efficiency Plan goes to work for a company. Write for complete information about this Plan. It costs nothing. There is no obligation.

Better Multiwall performance through better planning

union camp

UNION'S PACKAGE ENGINEERING DEPARTMENT will study your Multiwall bagging methods and equipment and make appropriate recommendations, regardless of the brand of Multiwalls you are now using.

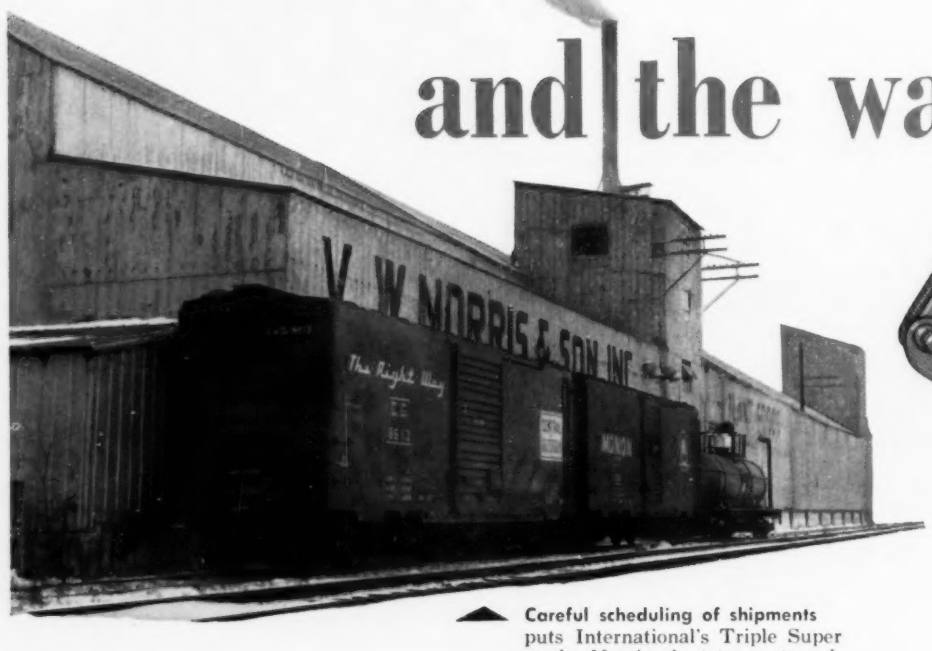
UNION MULTIWALL BAGS

UNION BAG-CAMP PAPER CORPORATION

233 BROADWAY, NEW YORK 7, N. Y.

It all boils down to this...

"We like and the way



Careful scheduling of shipments puts International's Triple Super at the Norris plant to meet peak-season demands. The Norris plant, a crane-type installation, was built in 1946.

R. W. (Dick) Thatcher, sales manager, and Plant Superintendent Walker Elliott inspect the uniformity of granular 5-20-20. The company produces 12 different grades of granulated plant food, all sold within the rich crop and livestock area surrounding Rushville.

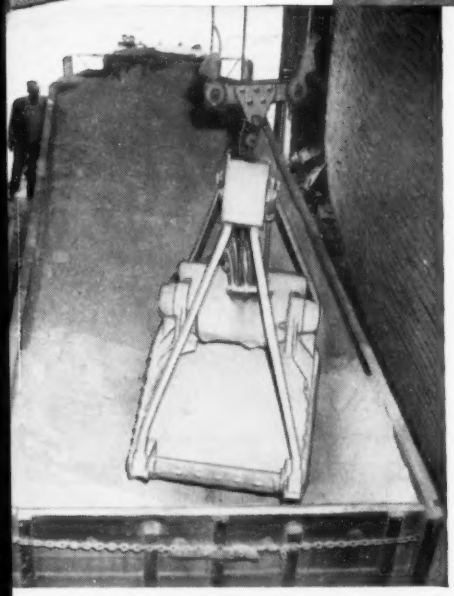
International's Triple they do business"

says

A. C. NORRIS,

president

V. W. Norris & Son, Inc.
Rushville, Indiana



Nearly all materials handling, including the unloading of trucks, is done by crane. All production employees are trained to operate crane ... keep clam-shell operating round-the-clock in peak seasons.

INTERNATIONAL's personalized service and quality product have helped V. W. Norris & Son build a healthy demand for granular fertilizer around Rushville, Indiana.

The Norris company installed its granulation unit in 1954 and became the first Indiana plant to granulate all grades. A veteran of 60 years' experience in selling fertilizers, the firm has manufactured its own mixed goods since 1946 when the present plant was built.

Norris' plant is an overhead crane-type operation — with a one-ton clam-shell that unloads trucks . . . moves raw materials to batch hoppers . . . transfers mixed goods to storage bins. It's about as close to a one-man operation as you can get.

And International's Triple Super is a plant regular. Alfred Norris has two reasons. "International delivers the triple we need . . . and we like the way they do business."

Benefit now from International's dependable service and top-quality product — make International's Triple Super a regular in your own plant. Write or wire for full information.

INTERNATIONAL MINERALS *International* MINERALS CHEMICALS **& CHEMICAL CORPORATION**

PHOSPHATE CHEMICALS DIVISION .... 20 N. WACKER DRIVE, CHICAGO 6, ILL.

New from Du Pont...

UAL-S

A Uramon® Ammonia Liquor containing ammonium sulfate for improved manufacturing and agronomic properties

Now, Du Pont offers a "Uramon" Ammonia Liquor containing ammonium sulfate. This new urea-ammonia solution, called UAL-S, combines two efficient forms of nitrogen with ammonium sulfate to provide added sulfur . . . an essential plant nutrient with recognized agronomic value.

All fertilizers benefit from nitrogen derived from UAL-S. Regular mixtures cure well, are free-flowing and resist caking. In granular mixtures, UAL-S aids in producing good yields of hard, round, firm granules that store and distribute well.

UAL-S is safe—handles at moderate pressure and there's no danger of flash fires. It's non-corrosive to fertilizer manufacturing equipment, including mild steel and aluminum. UAL-S has a low freezing point, too . . . can be stored year round in most areas.

Du Pont specialists can give you at-the-plant advice on proper use of UAL-S in your fertilizer mixtures. They stand ready to assist you in profitably formulating mixtures containing UAL-S. For further information on UAL-S, and to request the services of one of Du Pont's specialists, write the nearest office.

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AMMONIA LIQUORS

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TRIPLE SUPERPHOSPHATE

From our company owned docks right in our plant, your Triple Superphosphate is loaded and on its way in a minimum of time. If you can be served by water — we can serve you best —

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JUST AROUND THE CORNER *by Vernon Mount*

Political mergers are getting almost as prevalent as corporate get-togethers were a couple of years ago. Egypt and Syria form a combine to surround their neighbors, who promptly reply by forming the Jordan-Iraq combine. Over on the other side of the globe, the Benelux countries have set up the European Common Market. These are the leading industrial nations of Western Europe, and the pooling of their marketing power will be a real problem to our export economy.

Economic mergers are, some of them, coming unbuttoned at the seams. Concerns have reached out pretty far, and some have proven hollow shells, like situations the elders among us can remember from 1929-30. The little feller will cheer this. The sober economist will regret unstuck mergers that made economic sense. But not many of these will come apart; the strong concern is a necessity in our modern way of life.

Just Around the Corner was a phrase we used to read a lot about in 1929-30. The only place you find it now is on the mast-head of this department. And there it means something entirely different.

Yours faithfully,

Vernon Mount

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ANHYDROUS AMMONIA

AMMO-NITE® AMMONIUM NITRATE FERTILIZER — 33.5% NITROGEN

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Modern, easily accessible manufacturing plant and continuing research.

Conveniently located service offices.

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Escambia Chemical Corporation

Pensacola, Florida

Distributed Exclusively by

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Atlanta, Georgia

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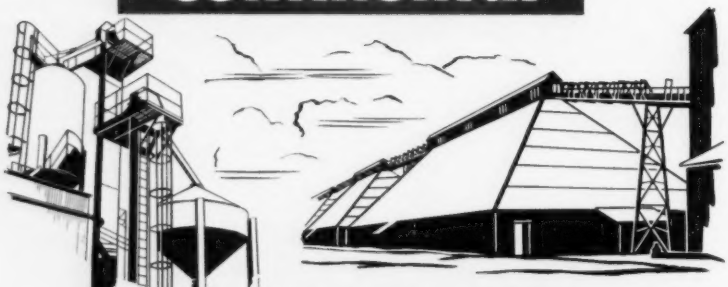

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INDUSTRIAL DIVISION

Continental Gin Company

BIRMINGHAM, ALABAMA

ATLANTA · DALLAS · KNOXVILLE · MEMPHIS · MOBILE · NEW YORK 17

WE SEE BY THE PAPER

LOVE-LIVES UPSET BY SCIENCE

Science is really disturbing love life in nature. We find that male screw-worms are being rendered impotent by the millions, via atomic energy, and then scattered among females of the species, who mate only once. Thus, by cruel deception, the race is being made to die out.

We observe advice to herdsmen, promulgated by Perdue. After advising good, hefty fertilization of pastures, they list ways to increase milk profits . . . among which they suggest we see to it our cows freshen in the Fall, when they give more milk.

And we read somewhere that gibberellic acid may help to control wild oats!

FOR PLANTS THAT HAVE EVERYTHING

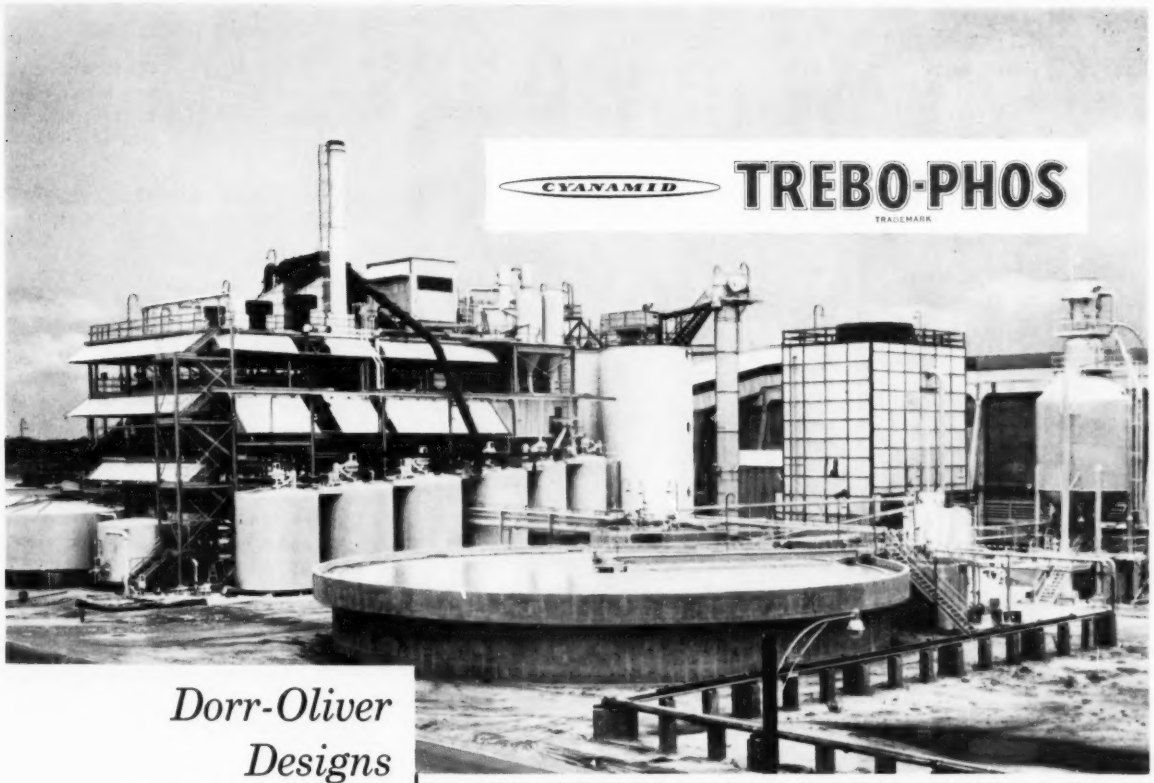
Our spies at Chicago report a new and pretty fancy type of fertilizer, obviously intended — as the 24K gold tooth-pick is meant for men who have everything — for plants that have everything . . . $1.96 per pound mink manure!

NAVY MAKES FRESH WATER

The scientific salts of the US Navy have learned what seems to be an easy way to make fresh water out of the sea. They freeze the salt water. That makes fresh water crystals and brine. They separate the brine from the crystals by compression and . . . voila! . . . fresh water. This may be pretty important if the water tables continue to go down in agricultural areas.

FOSSILS BRING NEW LIFE

Marine fossils that are many hundreds of million years old are being quarried in Colorado by a group of farmers, and spread on the soil in a test farm. After working it in, the irrigated plot will be planted to barley and oats. A control plot will be alongside. The land has been hard-packed and infertile for 11 years.



The new D-O designed and equipped triple superphosphate plant at Brewster, Florida. The open air building was specially designed for light, ventilation and economy. Note the water recovery and neutralization section in the foreground, the outdoor reaction system, and the two Doyle Scrubbers on top of the building.

Dorr-Oliver Designs and Engineers

NEW 200,000 TON PER YEAR TRIPLE SUPER-PHOSPHATE PLANT

for American Cyanamid Company ... at Brewster, Florida

The new Brewster, Florida plant of the American Cyanamid Company, one of the nation's largest chemical corporations, reached its design capacity of 200,000 tons per year of triple superphosphate in less than 3 months after initial start-up. Operating with the largest single stream phosphoric acid reaction system, made possible by a new type of vacuum cooling device, this plant produces a non-granular fertilizer which is ideal for subsequent ammoniation and compounding. The daily production of 600 tons consumes 220 TPD of high strength P_2O_5, and 600 TPD of H_2SO_4. Dorr-Oliver's 40 years of experience in the field of phosphoric acid and concentrated fertilizer production was fully utilized in the design of this plant.

Already established as one of the cleanest fertilizer plants ever designed, the Brewster mill far exceeds all requirements of the Florida Pollution Authority. Fumes and gases are scrubbed in series through two Doyle Scrubbers which each handle 25,000 CFM. Acid wastes are neutralized and clarified prior to discharge. An absolute minimum of water is consumed as 3,200 gpm is reclaimed in a 90′ dia. Dorr Clarifier. Make-up water in the water reclamation plant totals 800 gpm or only 20% of the total process water. Another D-O development is the Dorr-Oliver Traveling Pan Filter installation, where three 18 square meter units with a filtration area of 195 square feet are installed. Two of these units handle 1,100 tons of gypsum per day.

If you are considering entering the fast growing fertilizer field — or if you plan to expand present plant facilities — it will pay you to check with Dorr-Oliver. Write for Bulletin No. 8000, or better still, let us send an engineer to discuss your problem from the standpoint of economics and process. No obligation, of course.

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INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U.S.A.

MURIATE OF POTASH for the PLANT FOOD INDUSTRY

THIS symbol stands for high-grade coarse and uniform Muriate of Potash (60% K_2O minimum). Southwest Potash Corporation provides a dependable supply of HIGH-K* Muriate for the plant food industry.

*Trade Mark

Southwest Potash Corporation

61 BROADWAY ★ NEW YORK 6, N. Y.

WISCONSIN DOUBLING PLANT FOOD USE

A University of Wisconsin soil scientist, K. C. Berger, says Wisconsin farms will more than double fertilizer use in the next ten years.

FARMERS, DECREASING, ASKING MORE AES AID

The Florida AES has noted an interesting trend. While the number of farm families is decreasing, the requests are increasing for help in planning and management . . . up 22% last year.

ARKANSAS SHALE HAS TRACE MINERALS

A deposit of cannel shale near Tipton, Mo., is being studied to see if the trace minerals it contains may make it worth working for its agricultural value.

WHEN IS A PLANT A WEED?

Dr. J. P. Linduska, Remington Arms wildlife management man, makes a fascinating point: If—for example—a strawberry patch lies next to a raspberry patch and the one invades the other—the invader is a weed and is rooted out as such. Thus a weed is not a kind of plant, but a point of view.

WEATHER REPORTS TO SAVE FARM MONEY

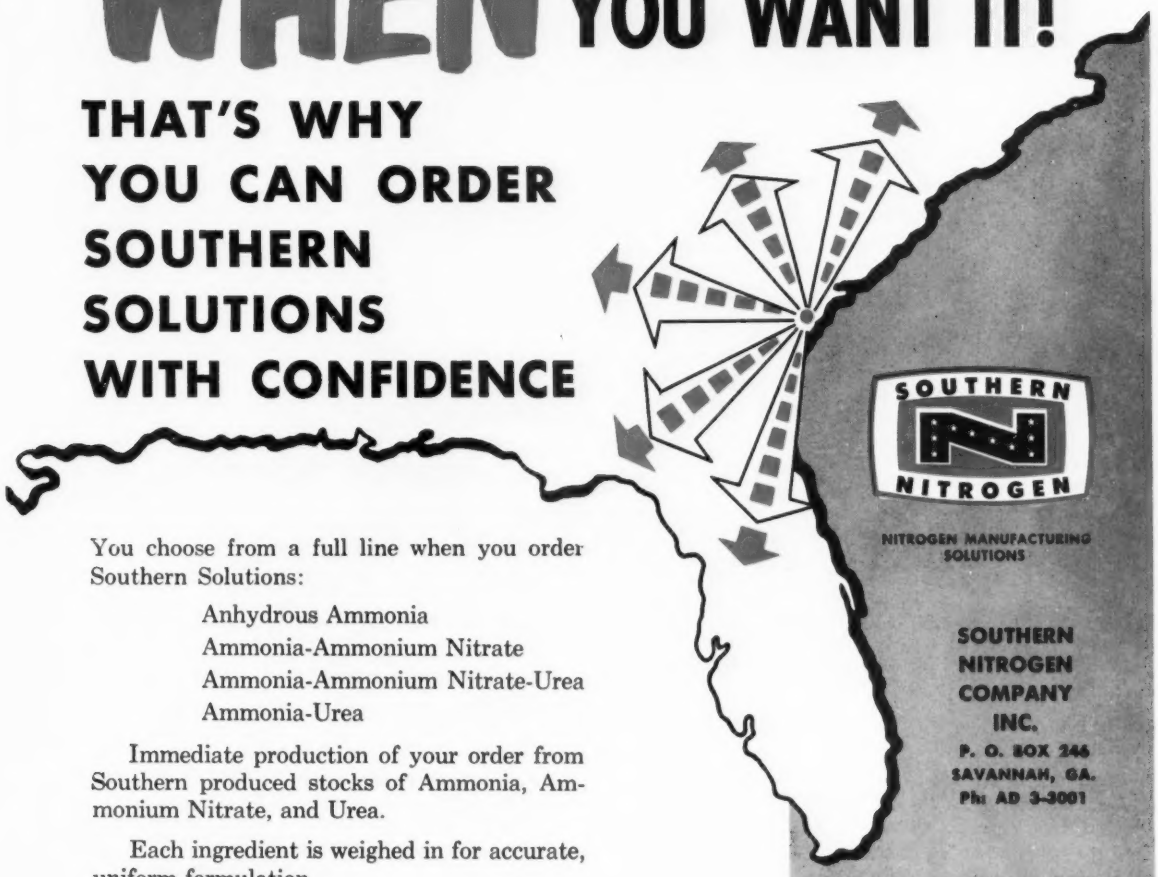
Mississippi agricultural forces are getting together with the weather bureau to see if more frequent and more detailed weather reports cannot be supplied farmers. This could save much money when, for example, a field is given crop chemical treatment, only to be deluged by rain which washes away the chemicals.

"MACHINE GUN" FIRES PLANT FOOD PELLETS

In El Paso Valley, Texas, a machine has been invented, constructed and tested which throws pelletized fertilizer as far as 100 feet. A big machine, it carries 6 tons per trip, and handles up to 40 acres a day on big fields. It was invented by Frank Sanders, manager of the Clint Branch of Southwest Fertilizer and Chemical Co., and he and Arthur Riggs, of the same company, built the first one. Southwest is using them now for custom fertilizing.

WHAT YOU WANT... WHEN YOU WANT IT!

THAT'S WHY YOU CAN ORDER SOUTHERN SOLUTIONS WITH CONFIDENCE



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You choose from a full line when you order Southern Solutions:

Anhydrous Ammonia
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Ammonia-Urea

Immediate production of your order from Southern produced stocks of Ammonia, Ammonium Nitrate, and Urea.

Each ingredient is weighed in for accurate, uniform formulation.

New aluminum tank cars feature design improvements in relief valves and dip-pipes.

Faster delivery—shorter shipping distances —five railroads serving Savannah.

All of us at Southern Nitrogen are pledged to give your order efficient, personalized service. May we?

5 Railroads to Serve you FAST

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SEABOARD AIR LINE
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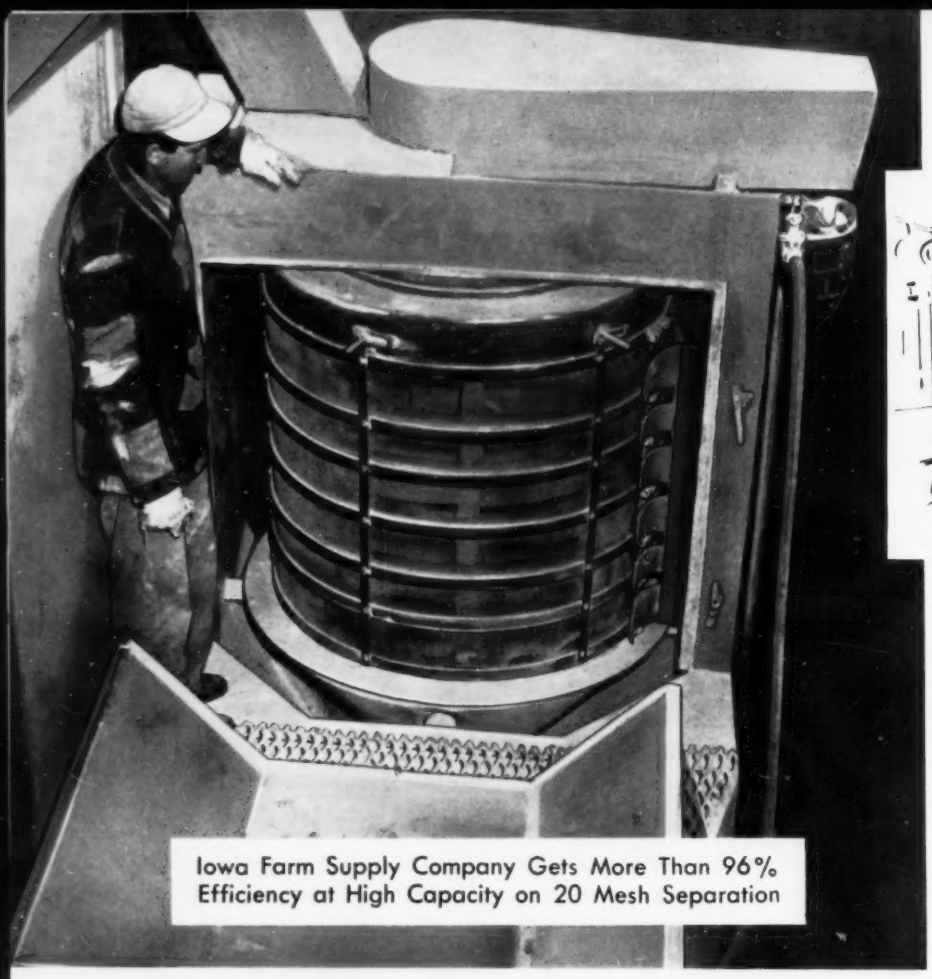
NITROGEN MANUFACTURING SOLUTIONS

AMMONIUM NITRATE

DIRECT APPLICATION NITROGEN SOLUTIONS



Iowa Farm Supply Company Gets More Than 96% Efficiency at High Capacity on 20 Mesh Separation

Left: Symons V-Screen utilizes centrifugal force to remove fines from the various grades of granular fertilizer at Iowa Farm Supply Co. plant. Note clearness of screen mesh.

An average sieve analysis of the product of the V-Screen, frequently made by IFS laboratory personnel to assure a consistently sized product at all times, is as follows:

Retained on Mesh	Per Cent by Weight	Cumulative % by Wgt.
5	0.3	0.3
16	89.7	90.0
20	6.0	96.0
−20	4.0	100.0

This indicates an efficiency of the screen of 96 per cent.

Originators of Granular Fertilizer Process use SYMONS® V-SCREEN to Upgrade Product

The Iowa Plant Food Company, which was formed at Des Moines by the Iowa Farm Bureau Federation, started a new era in the manufacture of inorganic fertilizer in the United States. It was the first plant of its type to manufacture a high analysis mixed fertilizer in granular form.

The granular product produced by the Iowa Farm Supply Company consists of combining a mixture of relatively dry solids for agglomeration through the addition of a liquid during suitable agitation. This mixture is then formed into spherical shaped granules by rolling in a revolving drum.

The dried granules range in size from approximately $\frac{3}{8}$" diameter to small grains. These granules are sized over a vibrating screen equipped with a 5 mesh square mesh cloth. Oversized granules are crushed and resized over the scalping screen.

The undersize from the conventional vibrating screen, minus 5 mesh to dust, is fed to a Symons V-Screen for final sizing on about 20 mesh, thus giving a final product of −0.156" to +.032" in size. The −20 mesh is returned to the ammoniator. At present, material is fed to the 36 sq. ft. of screening surface at the rate of about 55 tph.

This serves as an excellent example of the ability of Symons V-Screens to size material in the finer sizes at high capacity, ranging from 4 mesh down to as small as 80 mesh in some cases. *Write for complete information.* NORDBERG MFG. CO., Milwaukee 1, Wisconsin.

SYMONS . . . A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD.

NORDBERG

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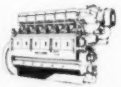
S-258

SYMONS CONE CRUSHERS

GRINDING MILLS

MINE HOISTS



DIESEL and GAS ENGINES

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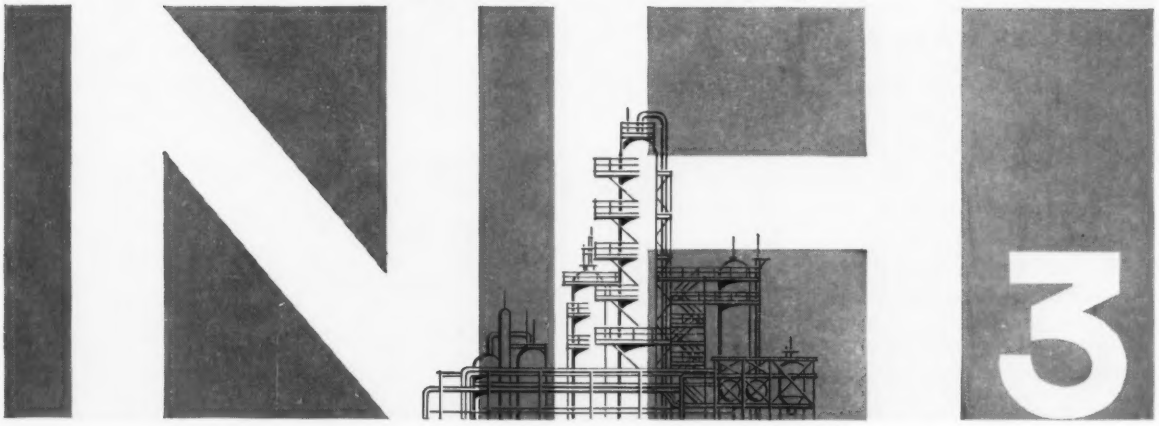
A vast new source of nitrogen solutions and agricultural



TEXACO'S LOCKPORT (ILL.) AMMONIA PLANT

If you use anhydrous ammonia, aqua ammonia or nitrogen solutions, here are some of the important advantages you get when you order from Texaco-Lockport:

CONVENIENCE—you get faster and better service, because the new ammonia plant is conveniently located in the heart of the farm belt. It is accessible to major rail, water and truck routes.

MAXIMUM PURITY PROTECTION—you get a pure, uniform product from the brand new process equipment. All-new handling equipment protects the purity all the way to your door.

FAST DELIVERY, ANYTIME—Ample storage facilities assure you of a constant supply, even during peak season. The brand new transport fleet makes deliveries according to your own schedule.

For fast, reliable service, call or write The Texas Company, *Petrochemical Sales Division*, 332 South Michigan Avenue, Chicago 4, Illinois, or 135 East 42nd Street, New York 17, New York.

TEXACO
PETROCHEMICALS

Around the Map

Outdoor billboards are being used extensively throughout central Florida to introduce the new package designs for Chase and Company's complete line of fertilizer products. The packages, and the billboard, were designed by Union Bag-Camp Paper Corporation.

ARKANSAS

Farmers Liquid Fertilizer Co., Patterson, has completed its plant, which is in an attractive, 2400 square foot plant that looks more like a modern office building than a fertilizer establishment. They will supply, in addition to balanced fertilizer, anhydrous, aqua and uren. They are licensed to use the TVA production process of liquid fertilizer production.

CALIFORNIA

Bandini Fertilizer, Los Angeles, are pleased at the prompt action of police, who broke up a ring of burglars who — among other thefts — robbed Bandini of 17 pieces of electrical office machines.

* * *

Romeo Packing Co., Princeton, lost $108,000 of liquid fertilizer, 39,000 gallons that went down the drain when vandals opened the taps on three big outdoor tanks, then broke into the plant and started up equipment that drained off an additional 3,000 gallons of unfinished fertilizer.

* * *

Downey Fertilizer and Dehydrating, Los Angeles, were cleared of a nuisance charge. It had been located in the complaining area for 30 years before the section was subdivided.

FLORIDA

Armour Fertilizer has begun construction on the 250 acre tract they have purchased at Davenport. The mixing plant building will employ 100; is a 200 by 300 foot building.

INDIANA

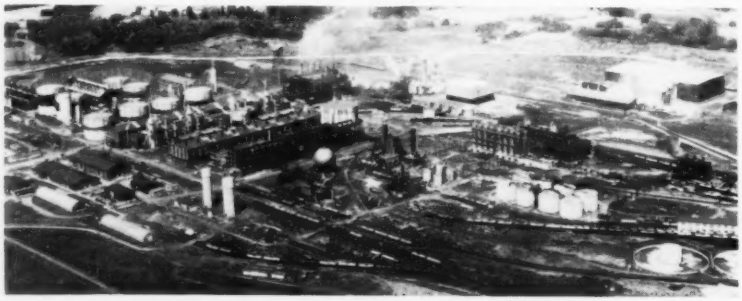
Farmers Elevator Co., Oakville, broke ground early last month for a liquid fertilizer plant, which it hoped to have in production this month. Farmers was organized in 1919, and is headed by Harold Nottingham.

KANSAS

US Industrial Chemicals, division of National Distillers, has put into production at its Sunflower plant new sulphuric acid decomposition and purification facilities. These will provide their mid-West customers a means of profitably disposing of spent acid. The equipment has a capacity of 70 daily tons of spent acid alkylation. The facility was designed by Chemical Construction Corp., and brings to 250 daily tons, on a 100% sulphuric acid basis, the total capacity of the Sunflower plant.

LOUISIANA

California Spray Chemical has announced a $35,000 program of expansion to its plant in Bossier Parish. District manager J. P. Toffaleti says it will add storage space and sharply increase production of crop chemicals, of which they are already making 50 varieties. The expansion includes a new liquid unit to produce various phosphate chemical sprays, increasing liquid production about 30%.



Revamping at the South Point, Ohio, plant of Nitrogen Division, Allied Chemical & Dye Corp., will boost urea capacity from 80,000 to 110,000 tons a year. When work is complete, the Division's total urea capacity will be 220,000 tons a year, largest in the industry.

MISSOURI

Boss Fertilizer, new Moberly concern reported here last month, held a demonstration meeting attended by more than 100 farmers from the vicinity, early last month. Their plant was expected to be in operation early this month, and an open house is planned at that time.

NORTH CAROLINA

Acme Fertilizer Co., Wilmington, began its 75th year of operation January 1. It has been in the same family throughout these years, the present president, Thomas H. Wright, Jr., being the grandson of founder William Gilchrist. His father was president for nearly 25 years. The factory remains at Acme, where it started, only the main offices having been moved to Wilmington.

10 years ago the concern added insecticides to its output.

PENNSYLVANIA

Organic Corp., McKeesport, is planning to re-open, and is negotiating with the City for its garbage.

TENNESSEE

Grace Chemical is adding to and modifying Memphis urea facilities, according to William J. Haude, president. Starting soon, the construction is expected to be completed in 15 months. Design is being done by the Company and by Foster-Wheeler who built the $24,000,000 plant in 1954. The plant now produces 150 daily tons of urea, plus 300 tons of anhydrous ammonia.

TEXAS

Smith Company, Uvalde, is a new corporation formed of several well-established units; The ten-year-old concern, The Smith Co.; Pearsall Division; Giles Chemical & Fertilizer Co. S. C. Smith is president; W. W. Plowman, Jr., vice president; D. H. Speir, secretary-treasurer. In addition to producing crop chemicals and distributing anhydrous ammonia, they are distributors for California Spray Chemical, Dow Chemical, Phillips Petroleum, Rohm & Hass, Chemagro, Geigy and others, including the complete Ortho line.

Arcadian® News

Volume 3 | For Manufacturers of Mixed Fertilizers | Number 3

Tips to Help You Speed Production

Another late season is shaping up. This means that last-minute buying by farmers will require peak production to get the tonnage out. Manufacturers who are able to mix and ship at a rapid rate will make more sales.

There are many things you can do now to prepare to meet this situation. Arrange for your raw materials in advance so that you will have supplies on hand when needed. Organize traffic patterns for incoming and outgoing trucks, to speed handling. Set up a routine for checking equipment, to avoid breakdowns. Plan to use late-season, extra bin space for dumping in small piles for faster curing. Plan to keep bagged fertilizer stacked low to reduce bag set.

Selection and use of the proper ARCADIAN® Nitrogen Solutions can be a big help in speeding output. For example, these Solutions, direct from tank car or storage, can supply in one operation different forms of nitrogen often added as separate materials. This saves time, labor, traffic and expense.

Mixtures made with large amounts of solid nitrogen materials cure slowly. It pays to ammoniate with ARCADIAN Nitrogen Solutions at maximum rates to produce mixtures that cure more rapidly. The increased ammoniation rate pays off in extra volume of better quality goods.

ARCADIAN Nitrogen Solutions with a low water content help to produce mixtures that cure faster, especially when used with superphosphate of relatively high water content. For granular fertilizers, NITRANA® Solutions 2M, 3M, 3MC, 7 and some URANA® are ideal. For non-granular fertilizers, URANA® 10 or 13 are generally most suitable.

The ARCADIAN Manual on Nitrogen Fertilizer Solutions for Fertilizer Manufacturing contains useful information to help you produce quick-curing quality fertilizers. If you do not have a copy, obtain yours from Nitrogen Division, Allied Chemical, 40 Rector St., New York 6, N. Y.

Many fertilizer manufacturers have found that they can mix and ship at a rapid rate, by ammoniating with URANA Solutions. The improved crystal structure produced by URANA reduces hardness of set in the pile and secondary caking in the bag. You get faster cooling and curing in rehandling ammoniated fertilizers before storing.

Your Nitrogen Division technical service man is familiar with methods and materials that speed production of good-quality mixed fertilizers. Getting his advice and assistance now may help you to mix and ship more tonnage during your peak period. This service is available to customers without charge. Simply contact Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N. Y.

It Pays to Be Ahead of Your Competition

The more you put into mixed fertilizers to benefit the farmer, the more difficult you make it for home-mixers to match your product and your service. Producing better fertilizers is one of the best ways to stay ahead of your competition.

The term "complete fertilizer" once meant nitrogen, phosphorus and potash. Today "complete fertilizer" can mean nitrogen, phosphorus, potash, calcium, sulphur, and magnesium . . . plus "trace elements" such as boron, copper, iron, manganese, zinc, molybdenum and cobalt, as needed by the crop and the soil. Some complete, mixed fertilizers now also contain insecticides in addition to plant foods.

TONNAGE OPPORTUNITY

The fertilizer manufacturer who simply mixes sources of nitrogen, phosphorus and potash, without considering the complete needs of the crop and soil, is bound to face stiff competition.

Every farmer prefers to use fertilizer that contains everything his crop needs, over and above what his soil can supply, to produce profitable yields. He also prefers a homogeneous, chemically-blended fertilizer that is well-cured to stay in good condition in storage and flow freely through his distributor.

Proper selection and use of nitrogen in manufacturing mixed fertilizers can be a highly-important factor in winning the battle against competition. Most crops need more nitrogen than any other plant food. Most crops also need graduated feeding with nitrogen that becomes available according to the feeding schedule of the crop.

When fertilizer contains the correct forms and amounts of nitrogen in balance with other plant foods, the farmer can supply the complete needs of his crop with one trip across his field. This saves time and labor and makes fertilizer more economical and more attractive to the farmer.

The fertilizer manufacturer who supplies the complete nitrogen needs of a crop with mixed fertilizers reduces the need for straight nitrogen materials. This increases his mixed goods and plant food sales at a greater profit than he usually makes from selling straight nitrogen materials.

The newly-developed, modern ARCADIAN® Nitrogen Solutions make it easy and practical to ammoniate superphosphate to produce high-nitrogen, high-analysis, good-condition mixtures. By proper selection of Solutions, fertilizers can be made to contain various forms of nitrogen, such as nitrate, urea, and ammonium nitrogen.

Home-mixers and small blenders are not equipped to ammoniate superphosphate, a big advantage enjoyed by the fertilizer manufacturer. Ammoniated superphosphate not only puts nitrogen and phosphorus into the fertilizer, it also adds calcium and sulphur. And it provides an excellent base to which other ingredients can be added as needed by the crop and soil. And proper ammoniation enables the manufacturer to produce high-analysis, free-flowing fertilizers.

Feed manufacturers have been highly successful in holding and building their market by producing a complex product containing many ingredients needed by livestock. Fertilizer manufacturers can be equally successful by putting more in their product . . . more of the needs of crops and soils . . . more free-flowing, non-segregating, easy-handling quality . . . more economy and more efficiency. This is the way to stay ahead of your competitor who cannot match your superior product.

The Best Fertilizers are Mixed Fertilizers
Buy Yours NOW!
NITROGEN DIVISION, ALLIED CHEMICAL · SUPPLIERS OF NITROGEN TO THE FERTILIZER INDUSTRY

Shown above is another powerful billboard in the continuing Nitrogen Division advertising campaign to urge farmers to purchase their plant food in the form of mixed fertilizers. This billboard is now appearing in hundreds of locations in leading farming areas where it will be seen by millions of farmers. Nitrogen Division, Allied Chemical, produces and sells nitrogen. But Nitrogen Division has always aggressively supported the importance of using nitrogen in a balanced fertilizer program. We trust these efforts increase your sales. If you wish a full-color miniature reprint of the poster shown above, request this from Nitrogen Division, Allied Chemical, 40 Rector St., New York 6, N. Y.

Fertilizer performance in the field is really what counts to the farmer. Properly-used fertilizer is worth two to five times its cost, in yields and profits.

But, if an unsuitable analysis is used or the fertilizer is improperly placed, fertilizer can be a costly production item. And a low rate of use is usually much less profitable to the farmer than adequate application.

Every fertilizer manufacturer, salesman and dealer owes it to his customers to know how to use fertilizer to make crops make the most money. Profits for the farmer and the fertilizer man depend on the proper use of fertilizer.

It takes time and effort to learn how to recommend a profitable fertilizer program to farmers. And time is money! But when you sell extra bushels and extra profits, instead of simply selling N, P and K, a farmer is willing to pay for YOUR product and YOUR service. He gets more results per dollar invested.

Many surveys show that the farmer depends more on the dealer than on anyone else for advice on fertilizers. Alert dealers are taking advantage of this fact to sell a program. Thus they get a better price for fertilizer and more repeat sales. Crop-producing power and profit-potential are more important to the farmer than price.

Don't make price the important sales point. Somebody else will always undercut you!

EXPANDING UREA PRODUCTION. To meet increasing agricultural and industrial demands for urea, Nitrogen Division, Allied Chemical, is now enlarging the productive capacity of its plant at South Point, Ohio. Urea is used in making ARCADIAN® URANA® Nitrogen Solution for manufacturing mixed fertilizers, URAN® Nitrogen Solution for direct application to the soil, UREA 45 pelleted nitrogen fertilizer, PROCADIAN® Urea Feed Mixture, and Crystal Urea for industrial use. In 1954, the South Point plant introduced a new process for urea synthesis developed by Allied Chemical research. This process is capable of producing urea of exceptional purity.

Where do farmers seek advice on fertilizers?

Which sources of information does the farmer depend on for advice on the fertilizer he buys? Some pertinent answers to this question are contained in the results of a recent survey by an independent research organization employed by Nitrogen Division, Allied Chemical. Motivations which influence fertilizer buying were studied in four midwestern states. PART I of the results has already been distributed and PART II is now available. To obtain your free copy, simply request Farm Fertilizer Survey, PART II, from Nitrogen Division, Allied Chemical, 40 Rector St., New York 6, N.Y.

TANK TRUCK DELIVERY. In addition to operating the largest fleet of railway tank cars in the industry for shipment of nitrogen solutions, Nitrogen Division, Allied Chemical, also makes deliveries in some areas in tank trucks like that shown above. The high-pressure tanks have a capacity of 4,575 to 5,090 gallons and the trucks are equipped for loading and unloading.

HERE'S THE BIG LINE OF Arcadian NITROGEN SOLUTIONS

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	26
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.188	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.052	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
10	44.4	24.5	56.0	10.0	9.5	11.0	1.108	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.081	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.925	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.972	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	—

Other ARCADIAN® Nitrogen Products: UREA 45 • A-N-L® Nitrogen Fertilizer Ammonium Nitrate • American Nitrate of Soda • Sulphate of Ammonia

NITROGEN DIVISION Allied Chemical & Dye Corporation

MAIN OFFICE: 40 RECTOR STREET, NEW YORK 6, N. Y., PHONE HANOVER 2-7300

Hopewell, Va., P. O. Drawer 131 ..... Cedar 9-6301
Ironton, Ohio, P. O. Box 98 ..... Ironton 8-4366
Omaha 7, Neb., P. O. Box 166 ..... Bellevue 1464
Raleigh, N. C., 16 W. Martin St. ..... Temple 3-2801
Columbia 1, S. C., 1203 Gervais St. ..... Alpine 3-6676
Atlanta 3, Ga., 127 Peachtree St., N. E. Jackson 2-7805
Memphis 9, Tenn., 1929-B South 3rd St. Whitehall 8-2692
Columbia, Mo., P. O. Box 188 ..... Gibson 2-4040
Indianapolis 20, Ind., 6060 College Ave. Clifford 5-5443
Kalamazoo, Mich., P. O. Box 869 ..... Kalamazoo 5-8676
St. Paul 4, Minn., 45 N. Snelling Ave. ..... Midway 5-9141
San Francisco 4, Cal., 235 Montgomery St. Yukon 2-6840

Basic G Industries has completed its plant in Houston, for construction of which Houston people bought more than 10,000 shares at $5. President Edward E. Harding predicts it will gross $500,000 this year and net $50,000. He further predicts it will double output every year for the next three years. B. L. Henderson, formerly president of Campbell Fertilizer Co., Houston, has been retained on a one-year contract to supervise production and sales in a 300 mile radius area.

VIRGINIA

National Aniline Division of **Allied Chemical and Dye** is placing into use at Hopewell what is believed to be the world's largest stainless steel crystallizer to wring ammonium sulfate crystals from solutions. The 150-ton unit, fabricated by **Struthers Wells Corp.** of 316 stainless from **Allegheny Ludlum Steel,** is 82 feet high and 20 feet in diameter. Allied's experts report that continuous production in the huge crystallizer will result in a more uniform crystal, and will be more economical that the former method of crystallizing the solutions in a number of smaller tanks.

CANADA

Canadian Industries Ltd. is in commercial production with its new $9,000,000 anhydrous ammonia plant at Millhaven, Ontario, according to general manager J. D. Converse.

The new plant employs the latest industrial techniques for ammonia synthesis and is the only one of its kind in Canada using fuel oil as a raw material. A number of other process features are 'firsts" in that country. The plant occupies 10 acres adjacent to the company's "Terylene" polyester fibre plant located on Lake Ontario 13 miles west of Kingston. Daily production capacity is 200 tons.

Process control plays an important role in the safe and efficient operations of the plant. Wherever possible, operations are controlled automatically by instrument panels. Vital process controls are located on a central control panel which is under continuous observation by skilled operators.

When the plant was being planned, major consideration was given to employee safety, fire protection and air and water pollution control. The services of Dr. Thomas W. Beak, Ottawa biologist, have been retained to keep a constant check on pollution control in Lake Ontario near Millhaven works.

The plant has 90 employees and is operated on a continuous basis. A. A. Perley is plant superintendent and H. M. Sherwood is manager of C-I-L's entire Millhaven works.

ENGLAND

Fisons Ltd. are using photocell counting at their sack filling machine in their Barking plant. The device not only counts total sacks filled per shift, but lists the load per truck and the number of burst sacks. The equipment was supplied by Electronic Machine Co. Ltd., Thornton Heath, Surrey, England.

ISRAEL

Dead Sea Works, upon completion of a carnallite reservoir now under construction, should reach capacity production this Fall. Last year it produced at the rate of about 10,000 monthly tons of potash. Additional potash plants are under consideration, which would call for pipelines from Sodom to Eilat, or to the Mediterranean, through which the carnallite would be pumped.

ITALY

The Anice Co. is ready for production with its plant which turns out both synthetic rubber and nitrogenous fertilizer at Ravenna. The fertilizer capacity is 65,000 annual tons. After satisfying the home market the concern plans to export fertilizer to the East.

KOREA

The South Korean Government has awarded a $23,500,000 contract to three West German firms: Lurg, Demag and Siemens, to construct a plant at Nanju, South of Seoul, which will produce 85,000 annual tons of fertilizer. Work, planned to begin in May, is expected to be completed by September 1960. The German firms proposed a long-term loan to finance the project.

PAKISTAN

P.I.D.C.'s Daudkhel fertilizer factory went into production late in January, having been under construction since March 1954. Two additional proposed PIDC plants of 250,000 tons each have already been reported here, at Multan and Sylhet. **To** undertake the latter, a team of **Japanese** experts was due to arrive last month and preliminary work had already begun.

EGYPTIAN PRODUCTION OF FERTILIZERS, 1954-56

(Metric tons)

	1954	1955	1956
Superphosphate	107,887	137,051	156,516
Calcium nitrate (15.5%N)	159,000	190,900	172,000

Egyptian Fertilizer Industry Strives to be Self-Sufficient

Superphosphate is made by two plants which treat domestic phosphate rock. Calcium nitrate is produced by the Societe Egyptienne d' Engrais et d'Industries Chimiques, S.A.E., at its plant at Suez, but the rate of output suffered from hostilities in the Canal area in 1956. Potential capacity of the plant is 250,000 metric tons annually.

Egypt is still a large importer of fertilizers. Imports of these products totaled 295, 700 tons in 1956, compared with 420,580 tons in 1955, and 429,600 tons in 1954. These figures do not include the following imports of natural sodium nitrate from Chile (metric tons): 1954, 91,000; 1955, 31,000; 1956, 91,000.

Egypt hopes later to become self-sufficient in nitrogenous fertilizers. Societe Egyptienne des Produits Chimiques, S.A.E., is erecting a plant which is expected to produce 370,000 tons of ammonium nitrate (20.5 percent N) annually, using hydroelectric power from the Aswan Dam. The capital of £E22,000,000 for this venture will come principally from certain Egyptian Government ministries and agencies and such organizations as the Industrial Bank and the Manque Misr. It also has been decided to establish a plant at Suez, as an addition to the existing plant making calcium nitrate, to produce more than 100,000 tons of ammonium sulfate annually (20.6 percent N) from gypsum.

(Based on a report from the American Embassy, Cairo, via U. S. Department of Commerce, Chemical & Rubber Division.)

Canada Fertilizer Meets Murray Bay, Aug. 20-24

The former Plant Food Producers of Eastern Canada, now renamed Canada Fertilizer Association, is planning its annual meeting at the Manoir Richelieu, Murray Bay, Quebec, August 20-24. Dr. R. T. Allman is president; Donald Moffatt is secretary-treasurer. Convention chairman is A. Mooney, Canada Packers, Ltd.

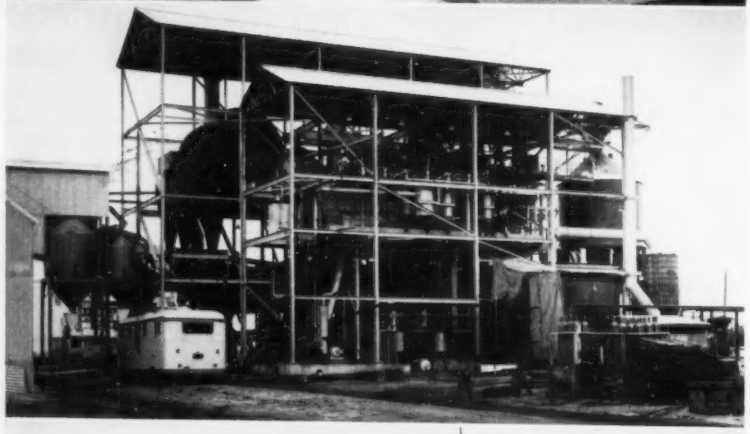
Coastal Goes Into Operation

Within ten months after construction got underway, Coastal Chemical Corporation's new 6½ million dollar plant on the Bayou Casotte Harbor at Pascagoula, Mississippi was ready for operation. The first product to be shipped was sulphuric acid from what is probably the world's largest single sulphur burning unit, capacity 600 daily tons of H_2SO_4.

The plant is located on the Bayou Casotte Harbor east of Pascagoula. The recently completed channel by the Pascagoula Port Authority is 1,000 feet wide and 32 feet deep. Coastal Chemical Corporation will receive through this harbor its phosphate rock from Florida and molten sulphur from the Louisiana-Texas area. Studies are also under way for receiving and handling water transported shipments of potash. The sulphuric acid plant, designed by The Titlestad Corporation of New York City, will product 60° and 66° Be acid for the market as well as 98% sulphuric acid to be used in Coastal's high analysis ammonium phosphate plant. Also under construction is an Oleum Plant which will produce 80,000 tons per year of oleum. The sulphuric acid plant will receive all of its sulphur in the molten state and has storage capacity for over 4,000 tons of molten sulphur. The sulphuric acid plant was constructed by the Reed Construction Company of Jackson, Mississippi.

The ammonium phosphate plant is the first of its kind in the United States. The design for these facilities was furnished by St. Gobain

(Continued on page 68)



1. Aerial photograph taken approximately thirty days prior to completion of the plant. Partially-completed dock and phosphate rock grinding plant are shown in the foreground. Directly beyond the rock plant are shown the ammonium phosphate product and storage facilities. In the upper left hand corner is the sulphuric acid plant and ammonia storage. In the upper right corner is the office building, laboratory, change houses, parts warehouse and maintenance shop.
2. The sulphuric acid plant showing acid storage and molten sulphur storage tanks.
3. The phosphoric acid and ammonium phosphate fertilizer plant. No siding will be installed on this building. All equipment has been designed to resist the weather conditions.
4. Coastal is experimenting with "A" frame type building, for storage of unground phosphate rock. Initial rock is being received by railroad, later by barge from Florida. Sulphuric acid and ammonium phosphate plant appear in the background.

Midwest Industry-Agronomist Meeting Tallies Record Crowd

Nearly 800 persons were attracted to Chicago for the Tenth Annual Joint Meeting of College Agronomists and Fertilizer Industry Representatives February 13-14.

National Plant Food Institute, sponsor of the gathering, reported this as an all-time high attendance for the conference, held in previous years under the auspices of Middle West Soil Improvement Committee, which became the Midwest regional office of NPFI this year.

Separate meetings had been held there earlier in the week by three groups of the college agronomists: North Central Soil Research Committee, the Midwestern Agronomists, and Midwestern Extension Agronomists. Midwestern Agronomists presided at the joint meeting with the fertilizer industry. **Dr. A. J. Ohlrogge,** Purdue agronomist who is retiring as chairman of the Midwestern group, presided at both morning sessions; **Dr. W. P. Martin,** Soils Department head at Minnesota, who is the newly-elected chairman, presided at the afternoon session on the opening day.

Dr. Russell Coleman, NPFI exexutive vice president, and **Richard E. Bennett,** president of Farm Fertilizers at Omaha (and final president of MWSIC), welcomed the crowd in opening the program which focused on Corn Belt problems and practices.

♦

Corn yields as high as 150 bushels per acre have been obtained with irrigation on fertilized fields when a late-maturing hybrid variety was experimentally used, the group heard from **Dr. Floyd Smith,** Kansas State College agronomist.

He said irrigated corn fertilizer studies have revealed a number of problems, including the choice of proper corn plant populations per acre, the lengths of maturities of hybrids and the incidence of nitrogen shortages in newly-developed irrigation areas.

The tests were made at the Irrigation Experiment Field near Concordia, Kansas and on various farmer-cooperator sites in the Kansas River valley, of Eastern Kansas, he revealed.

Reporting on the need for plant nutrients by Kansas soils, Dr. Smith said that deficiencies of nitrogen, phosphate and potash have been found in various areas of the state. Use of 25 to 50 pounds of nitrogen per acre for small grain production is recommended in Eastern and Central Kansas, he said. For corn and grain sorghums, 40 to 80 pounds per acre of nitrogen is recommended under favorable dry-land conditions.

"Phosphate, potash and lime recommendations, are based, whenever possible, on specific soil test findings," Dr. Smith stated. "Continued attempts are being made to improve correlations between soil test findings and actual field results."

He pointed out that various forms of nitrogen fertilizer give equally good results in increased yields of wheat. Spring or fall applications are similarly effective, he said, because leaching of nitrogen is not an important problem in Kansas.

Dr. Smith reported their tests indicated that water solubility of phosphate is not significant in determining the effectiveness of fertilizer for small grains.

♦

An Ohio agronomist reported that soil fertility can be built up to such a high level that heavy row fertilization for crops is unnecessary. **Dr. H. J. Mederski,** of the Ohio State University agronomy staff, based his statement on results of tests for the past several years to determine the response of crops to various systems of fertilization.

"In some tests," said Dr. Mederski, "we have compared fertilization systems in which a fixed amount of phosphate and potash fertilizer was applied over a five year period.

"In one case, only small amounts of starter phosphate and potash were used annually in combination with large amounts of bulk-spread nutrients.

"In the second case, the same total quantity of fertilizer was applied, but it was equally distributed among each crop each year.

"The results indicate that the total crop yields from the two systems of fertilization are essentially the same.

"We have also found the yield increase from row fertilization became smaller as the fertility level in soil increases. These and other studies indicate that we are able to build or increase the soil's fertility level to the extent that heavy row fertilization is unnecessary."

Dr. Mederski said that results of most of the fertility research work indicate that "there is no one best fertilizer program for field crops."

"The kind and quantity of fertilizer required for maximum production depends on the fertility characteristics of the soil. And although rates of row fertilization and distribution of fertilizer in the rotation may be important at low levels of fertility, its importance as a yield factory diminishes with increasing fertility levels."

♦

The new wheel track method of planting corn on freshly plowed

Agronomists Elect New Officers

North Central Soil Research Committee

CHAIRMAN: W. H. Pierre, head, Agronomy Dept., Iowa State College
SECRETARY: R. L. Cook, head, Soil Science Dept., Michigan State Univ.

Midwestern Agronomists

CHAIRMAN: W. P. Martin, head, Soils Dept., University of Minnesota
VICE CHAIRMAN: George E. Smith, Soils Dept., University of Missouri
SECRETARY: Charles Simkins, Soils Dept., University of Minnesota

Midwestern Extension Agronomists

CHAIRMAN: Charles Simkins, Soils Department, University of Minnesota
VICE CHAIRMAN: Orlo Musgrave, Ohio State University

ground, without harrowing and disking, can save farmers considerable time, labor, fuel and machinery costs, **Dr. A. E. Peterson,** University of Wisconsin soils specialist reported to the audience.

Another advantage is that wheel track planting can reduce soil erosion and produce crops more efficiently, he said.

Dr. Peterson reported that in practically all cases, yields of wheel track planted corn have been equal to or higher than those grown with conventional seed bed preparation.

Wheel track corn yielded 123 bushels compared with 116 bushels grown by conventional tillage at the LaCrosse Soil Conservation Station, he said. With the wheel track method, the field can be plowed and planted the same day.

"The planter is pulled behind the tractor and the corn is planted in the tractor wheels," Dr. Peterson said. "The wheel tracks provide a firm seedbed for the corn."

Among additional advantages of wheel track planting, he stated, are: The minimum tillage helps maintain soil moisture. More moisture soaks into the field and runoff is reduced.

Corn will germinate uniformly, particularly in dry years. The freshly-plowed furrow usually contains enough moisture so the seed germinates rapidly.

Weed control is more efficient. With wheel track planting, the corn and weed seeds in the row begin to germinate at the same time, while weed seeds in the loose soil between the rows remain dormant. Therefore, the corn is usually 6 to 12 inches high before cultivation is necessary. A weed spray broadcast or over the wheel track delays this first cultivation even further and may entirely eliminate cultivation for weed control.

"Wheel track planting is not a cure-all for corn production problems," Dr. Peterson said. "You must follow good cultural practices.

"The corn variety must be adapted to your area.

"Soil tests should be used to make sure adequate amounts of starter fertilizer and sidedress fertilizer are applied."

Starter fertilizer can be drilled in the row at planting time, as fertilizer equipment is now available for putting the plant food in a band two inches to the side and an inch or two below the seed level. This is most efficient fertilizer placement method for corn, he said.

Weed control should be carefully considered and followed through, he added.

Dr. Peterson reported also on experiments of seeding alfalfa in corn rows spaced 40, 60, and 40-80 inches.

This interseeding method, he said, "appears inviting to many farmers in Wisconsin, since it makes possible growing corn in a short rotation and still retarding soil erosion."

Corn yields from 40-inch rows have been in the vicinity of 90 to 110 bushels per acre. Almost equal yields have been obtained from 60-inch rows when an equal plant population was obtained, Dr. Peterson reported.

Excellent alfalfa stands were obtained in the 60-inch rows, unless the field was very weedy. In the 40-inch rows, alfalfa stands have usually not been satisfactory.

♦

Economic factors are becoming increasingly important to soils specialists in making recommendations to farmers for fertilizer use, **Dr. John Pesek,** Iowa State College agronomist, reported to the conference. "Naturally, we wish to recommend the amount of fertilizer which will lead to the maximum profit per acre."

After several years of study, he said, agronomists have arrived at two limits of fertilizer recommendations: the upper limit, and the lower limit.

The upper limit or "optimum rate" of fertilizer application is the rate above which a farmer cannot go without reducing his total profits from fertilizer use per acre.

The lower limit is the "minimum recommended rate." A farmer cannot go below this rate without decreasing the per cent of profit from his fertilizer dollar, as well as reducing the profits per acre.

Dr. Pesek cited Iowa tests as an example of how the "optimum" and "minimum" rates work out.

In one test, an "optimum" rate investment of $17.70 per acre in 108 pounds of nitrogen fertilizer for corn returned $25.80 per acre profit—or a 146 per cent increase. Application rates above this level reduced the per-acre profit from fertilizer use and the percentage of profit on the investment.

In the same test, the "minimum" recommended rate of 44 pounds of nitrogen at $8.10, returned only a $16.20 profit per acre. When the fertilizer application rate went below the minimum rate, there was a decrease in the profits per acre as well as the return on the investment.

Summing up some of his conclusions, Dr. Pesek said:

"If there is plenty of money available to fertilize all acres as the optimum rate, this will lead to the highest profit for the farm.

"If there is as much as or more capital than is needed for the minimum recommended rate, but not enough for the optimum on all acres, then the farmer will obtain the maximum profits by spreading the fertilizer evenly over all the acres, assuming equal need for fertilizer.

In cases where there is not enough capital to apply the recommended minimum rate to all acres, the best procedure is to apply the minimum rate as far as the money permits and leave the rest unfertilized, Dr. Pesek reported.

"The whole field of agronomic-economic research is a new one," he said, "and one which is destined to grow for a long time."

♦

Farmers are being urged to shift as rapidly as possible from old fashioned split-boot corn fertilizer attachments to single band placement equipment which puts the fertilizer one side and below the seed, **Dr. E. R. Duncan,** Iowa State College extension agronomist, told the audience, citing these reasons why efforts should be made to shift from the present attachments to improved types:

(1) It would virtually eliminate present problems of injury in germination to seed.

(2) It may make it possible to apply all needed fertilizer with the improved types of attachments, where soil tests indicate fairly adequate fertility levels.

(3) More efficient use of commercial fertilizer can be expected, due to somewhat deeper placement.

(4) Placement of the fertilizer is less variable and less dependent on soil conditions.

(5) Improved equipment will make it possible to apply the most suitable fertilizer ratio for the crop, regardless of the soluble salt content.

(6) Rates of application of fertilizer can be more accurate with improvements in the design of hoppers and delivery mechanisms.

Dr. Duncan said complaints registered against the new equipment appear mostly to be due to faulty equipment or inadequate knowledge by farmers in adjusting the implements. "The points in favor of the single band method of placement to one side and below the seed appear to easily outweigh the points against this method."

CF Staff photos from Midwest meeting—

1. Bob Linderman, Int'l Min. & Chem. Corp.; Russell Coleman, Nat'l Plant Food Inst.; and W. E. Jones, Northwest Coop. Mills.
2. C. L. W. Swanson, Texas Co.; J. C. Engibous, Int'l Min. & Chem. Corp.; A. H. Bowers, Swift & Co.
3. Kermit Berger, U. of Wis., and Bill Dible, Int'l Min. & Chem. Corp.
4. Wendell Hoover, Ashcraft-Wilkinson Co., and Bill Corl, Darling & Co.
5. Arthur Riddell, Bradley & Baker; Ted Neeley, Potash Co. of Amer.; Harry Allen and Ralph Allen, Allerton Fertilizer Co.
6. Joseph L. Lanter, Central Farmers Fert. Co., and R. R. Zurbuchen, Coop. Farm Chem. Assn.
7. A. J. Ohlrogge, Purdue Univ., and Marvin Luers, Jasper County Farm Bur. Coop.
8. Shelton Appleton, Potash Co. of Amer., and Stanley Schaefer, Wis. Farmco Serv. Coop.
9. Hartl Lucks, Smith Ag. Chem. Co.; J. C. Engibous, Int'l Min. & Chem. Corp.; and William Bone, Monsanto Chem. Co.
10. K. D. Morrison, Phillip Bros. Co., and Ray Sorensen, Cornland Plant Foods.
11. William Caspari, Jr., Davison Chem. Co. Div. W. R. Grace; A. L. Milburn, Minnesota Farm Bureau Serv. Co.; and Tom Cushing, Wilson & Geo. Meyer Co.
12. H. L. Beckman, La Plata Chem. Co.; Dick Balser, Spencer Chem. Co.; and Earl Elsea, La Plata Chem. Co.
13. Rus Pisle and G. L. McGuffey, Sohio Chem. Co., and Walter Harding, Federal Chem. Co.
14. Sidney H. Rogers, Nat'l Potash Co.; Clyde Marshall, Commercial Solvents; and B. W. Guess, Swift & Co.
15. Merle Blue, Consumers Coop. Assn., and Walter Sackett, A. J. Sackett & Sons Co.
16. C. E. Workman, Tenn. Corp., and Morris Newman, Price Chem. Co.
17. L. T. Johnson, Tri-State Chem. Co.; Bob Day, A. J. Sackett & Sons Co.; A. G. Stevenson, Tri-State Chem. Co.; and Joe Prosser, A. J. Sackett & Sons Co.
18. Charles Martin, Miami Fert. Co.; Roy Howe and Bill Howe, Howe, Inc.
19. Ben McCollum, J. R. Simplot Co., and Louis Wilson, Nat'l Plant Food Inst.
20. Ralph Waltz, Wilson & Geo. Meyer Co., and B. P. Redman, Jr., Farmers Fert. Co.
21. Mark Henderson and James Schell, Kingsbury & Co.; Harold Douthit, Int'l Min. & Chem. Corp.; and Dave Weatherly, D. M. Weatherly Co.
22. Ed Aylward, Aylward Fert. Co.; Ernie Harper, Nitrogen Div., Allied Chem. & Dye; and Ed Crouse, U.S. Liquid Fert. Co.
23. J. R. Sargent, Federal Chem. Co., and H. V. Miller, Armour Fert. Works.
24. Bert Tucker, Sohio Chem. Co., and Earl Neuman, Ohio Farmers Grain & Supply Assn.

He urged machinery manufacturers to check carefully with agronomists while effective equipment is being perfected, and to adequately instruct their own personnel and dealers in the use of the equipment as it becomes available to farmers.

Dr. Duncan described research over the years by Midwestern agronomists on improved fertilizer placement for corn. Interest in more efficient fertilizer use has continued to mount as the farmer's production costs have moved gradually higher, he said. Starting in the mid 1940's most of the agricultural experiment stations in the Corn Belt began considering critically the problems of fertilizer placement.

The use of radio-active phosphorus as a tracer has made possible this more critical study. More careful evaluation of fertilizer placement methods was needed, because: The change-over from horse-drawn corn planters to tractor-drawn and mounted equipment with the accompanying speed-up of operations has created greater placement problems with the split-boot attachment.

The move toward higher analysis fertilizers and equal or greater number of pounds per acre has created more problems with germination and early growth of crop plants, he stated.

Interest in fertilizer placement has been stimulated by recognition of the ramification of different degrees

of water solubility of phosphates.

Dr. Duncan said a feeling exists among farmers that they would like some method of application which would take less time and effort than the present planter attachment and give equally satisfactory returns from fertilizer.

He reported that agronomists at all the state agricultural colleges contracted in the Corn Belt indicated that band fertilizer placement is equal to or superior to the split-boot attachments.

♦

A twofold program to help farmers realize the yield production potentials they can get for each of their major crops, was disclosed by **C. E. Trunkey,** of U. S. Industrial Chemicals (formerly with the National Plant Food Institute).

This "Production Potentials" program, he stated, is designed to: **1**—Give a farmer specific information on cultural practices that can make his farming operations more profitable; and **2**—Give him equally effective information to convince him that a better crop-producing job is possible on his farm.

The program is based on the assumption that farmers should know the crop producing potentials in their soils if they are to want to get high yields, Mr. Trunkey said. In this way, unit costs of production can be spread so that a good profit margin can be obtained on each bushel, ton or pound. The production potentials would supply the information for each individual farmer, depending on his soils and crops.

"Armed with this information," he related, "a farmer can set up realistic goals on his own farm, then roll up his sleeves and concentrate on the management practices that can help him realize these goals.

Midwestern agricultural colleges have been cooperating in the past two years in an effort to obtain reasonable crop production potentials in their states, according to Mr. Trunkey. The purpose, he said, is "to throw back the curtain on possible yields a farmer in any given locality can get for each of his major crops."

Production goals are to be printed on a state-by-state basis.

The University of Illinois and the University of Wisconsin have already helped in producing such material which is being made available by the Midwest regional office of the National Plant Food Institute. Similar material will be available for other Midwestern states as information is correlated and completed.

The Illinois and Wisconsin information is now available in wall charts with soil maps, which also include information on soil water supplies, special soils and crop management instructions, a discussion of the importance of the potentials and a listing of nine points which must be considered if farmers are to attain their yield goals.

To supplement the wall charts, check lists are also provided to help each farmer reach his own set goal.

The check list, or guide, sets forth information on the importance of (**1**) Providing the soil with the needed plant nutrients; (**2**) Using top quality seed; (**3**) Following seeding rates recommended by the state agricultural colleges; (**4**) Carefully conserving soils and moisture; (**5**) Using minimum tillage; (**6**) Keeping the soil in good tilth; (**7**) Controlling weeds, insects and crop diseases; (**8**) Harvesting carefully to save the crop; (**9**) Storing properly to preserve quality.

Specific suggestions are made under each point to emphasize each particular phase of soil and crop management.

The production potentials, concluded Mr. Trunkey, reflect the yields a farmer could easily average throughout a complete weather cycle, provided he uses the best management practices. He defined a "complete weather cycle" as one that includes both the good and poor years—seasons that might be wet or dry, warm or cold.

♦

"Midwestern farmers who are high-level users of fertilizer make an average gross income of $67 per acre annually, compared with $42 for non-users and the national average of $46 for all U.S. farmers," was the statement of two N.P.F.I. officials—**Dr. M. S. Williams,** chief agricultural economist, and **Zenas H. Beers,** Midwest regional director of the Institute.

More than 71 per cent of high-level fertilizer users have a capital investment of over $35,000 compared with 57 per cent for non-users, they pointed out. Only 40 per cent of high fertilizer users are 50 years or older, as against 53 per cent for non-users.

The speakers based their statements on results of the study recently made for N.P.F.I. by National Analysts, Inc., of Philadelphia, on "Farmers' Attitudes Toward Use of Fertilizer." A representative sampling was made nationally and regionally of farmers operating more than 100 acres. This sampling represented about 92 percent of total U. S. farm land.

As a result of the study, farmers were classified according to levels of fertilizer use as follows: (**1**) High—farmers who generally add fertilizer at rates close to levels recommended by State agricultural colleges; (**2**) Medium—farmers who use a fairly good level, but well below college recommendations; (**3**) Low—farmers who use some fertilizer, but an amount very inadequate for his type of crops and soils; (**4**) None—farmers who used no commercial fertilizer on either of their two most important crops during 1956.

Farmers interviewed rate the use of more fertilizer as next to the top in a list of selected practices that are "the mark of a good farmer."

The study indicated the average farmer's knowledge about fertilizer is limited.

More than 80 percent of all farmers said they know the plant food elements their soil needs, but nearly 50 percent gave wrong or partially wrong answers when asked to choose grades which would correct specified plant food deficiencies.

Dr. Williams and Mr. Beers reported also that:

Farmers rate agricultural college publications and county agents very high as sources of practical fertilizer information.

Farmers believe in soil tests. About 64 percent of fertilizer users reported having their soil tested, compared with only 32 percent of non-users.

The speakers said a considerable potential for fertilizer use in the Corn Belt is indicated by the following findings:

Only 9 percent of all farmers in the Middle West use fertilizer on their two most important crops at rates approaching those recommended by their state experiment stations.

About 36 percent of all farmers used no fertilizer on their first or second most important crops.

The remaining 55 percent used fertilizer at rates much less than considered adequate in all cases for the type of crop and soil involved.

Of all those using fertilizer on their most important crops, 61 percent used less than 250 pounds per acre.

"The Corn Belt farmer needs to know more about the real effects from proper fertilization," the two N.P.F.I. officials concluded. "He needs to get more information on factors such as: 1—His true cost of production; 2—His actual yield re-

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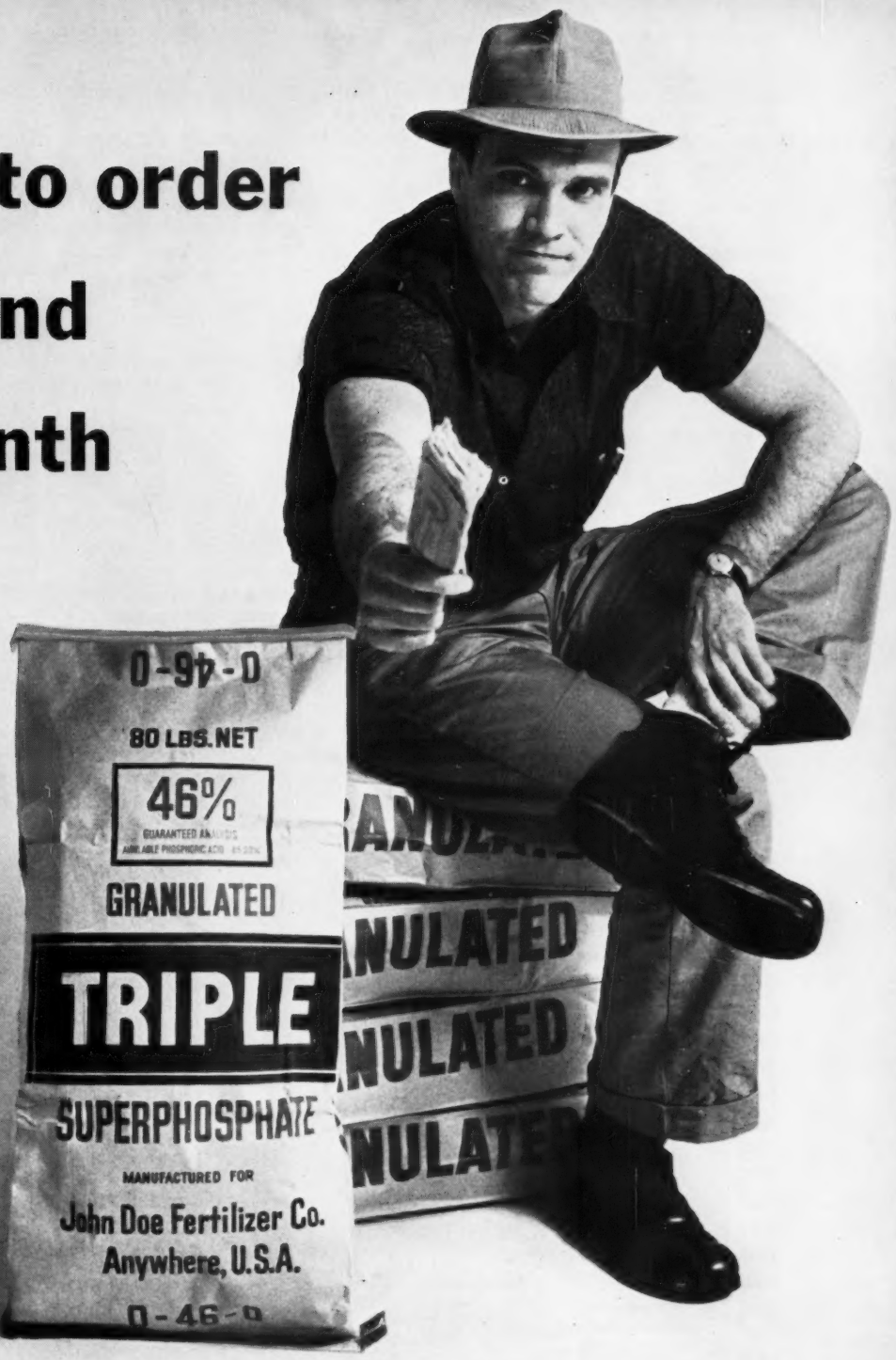

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sponse; 3—The role of commercial fertilizer in soil improvement; and 4—Measures of fertilizer response throughout the growing season."

♦

Less than 65 per cent of the farmers of the United States are using any commercial fertilizer on their soils, according to a report made to the group by two Iowa State College rural sociologists— **Dr. Joseph M. Bohlen** and **Dr. George M. Beal.**

The Iowa research men quoted Midwestern agronomists and farm economists to the effect that "a vast majority of the farmers now using fertilizer are not applying it in amounts sufficient to obtain the most profitable results."

"A major problem facing the fertilizer industry and educational institutions today is how to carry on merchandising and educational programs that will lead to optimum fertilizer use by more farmers," the sociologists reported.

The speakers cited the results of a survey of Iowa fertilizer dealers on factors that influence farmers' buying decisions and on the attitudes of dealers themselves toward fertilizer.

Forty-three per cent of the farmers interviewed said they "go along" when the state agricultural college or extension service recommends that a farmer use a certain amount of fertilizer per acre. Twenty per cent indicated they "probably will go along with it," and 13 per cent said they would "listen and/or think about it."

Eighty-seven per cent said they think that a farmer who has his soil tested every two years is "a good farmer, doing what's right, etc."

In reviewing the role of the fertilizer dealer, Drs. Bohlen and Beal reported that the dollar volume range of fertilizer departments of these dealers was from $5,000 to $38,000 a year, with an average of $18,500 gross sales in fertilizer. This amounted to a range of from 2 to 15 per cent of their gross business volume from all departments.

Eighty per cent of the dealers surveyed said they offer soil sampling services to their customers; 90 per cent said they help farmers plan their fertilizer programs; 88 per cent offer bulk applicator services; 100 per cent offer credit facilities; and 73 per cent provide small dry fertilizer spreaders.

More than 42 per cent of the dealers said they would provide more fertilizer services if they could receive some help from outside sources such as the wholesaler or jobber of fertilizer.

When asked how important they thought the use of commercial fertilizer was to the income and prestige of the farmer, 50 per cent of the dealers in the study said it was "very important"; 33 per cent thought it was "important"; and 8 per cent said fertilizer usage was "an absolute necessity."

Fertilizer dealers rank government agencies as the most important and reliable sources of information to their business. Commercial sources are a relatively close second, according to Drs. Bohlen and Beal.

♦

To wind up the gathering, the Midwestern Agronomists presented their grade and ratio recommendations for the coming crop year as shown below.

State Agronomists' Suggested Minimum Fertilizer Grade Needs of the Middle West for the Year Beginning July 1, 1958*

RATIO	ILL.	IND.	IOWA	KANS.	KY.	MICH.	MINN.	MO.	NEBR.	N.D.	OHIO	S.D.	WISC.
0:1:3	0-10-30	0-10-30				0-10-30	0-10-30	0-10-30			0-10-30		0-10-30
0:1:2	0-10-20	0-10-20	0-15-30		0-10-20	0-10-20							
0:1:1	0-20-20	0-20-20	0-20-20	0-20-20	0-20-20	0-20-20	0-20-20	0-20-20			0-20-20		0-20-20
0:2:1	0-20-10	0-20-10	0-20-10		0-16- 8	0-20-10	0-20-10			0-20-10	0-20-10		0-20-10
1:6:3						4-24-12		4-24-12		4-24-12			
1:4:1						5-20- 5							
1:4:4	4-16-16	5-20-20	5-20-20	5-20-20	3-12-12	4-16-16	5-20-20	5-20-20	5-20-20		4-16-16		5-20-20
1:4:2	5-20-10	5-20-10	5-20-10			5-20-10	5-20-10				4-16- 8		5-20-10
1:3:9	3- 9-27	3- 9-27				3- 9-27		3- 9-27					3- 9-27
1:3:6		3- 9-18									3- 9-18		
1:3:2					4-12- 8								
1:3:1						8-24- 8		8-24- 8					
1:2:4			5-10-20			5-10-20	5-10-20						
1:2:3		5-10-15			5-10-15						5-10-15		
1:2:2		8-16-16	8-16-16		5-10-10	8-16-16	8-16-16	8-16-16			6-12-12		8-16-16
1:2:1			10-20-10	10-20-10		10-20-10	10-20-10	12-24-12	10-20-10	10-20-10			
1:1:3					6- 6-18								
1:1:1	10-10-10	12-12-12	10-10-10	12-12-12	10-10-10	10-10-10	12-12-12	10-10-10		10-10-10	10-10-10		10-10-10
1:8:0		5-40- 0											
1:4:0	8-32- 0	8-32- 0	8-32- 0	8-32- 0		8-32- 0	8-32- 0	8-32- 0	8-32- 0	8-32- 0	8-32- 0	8-32- 0	
1:2:0	10-20- 0		10-20- 0	10-20- 0		10-20- 0	10-20- 0	10-20- 0	10-20- 0	10-20- 0		10-20- 0	
1:1:0	15-15- 0		15-15- 0	15-15- 0			15-15- 0		15-15- 0	15-15- 0		15-15- 0	
2:1:2						20-10-20							
2:1:1	20-10-10	14- 7- 7	20-10-10			12- 6- 6					14- 7- 7		
2:2:1						12-12- 6				12-12- 6			

*The production of higher grades of the suggested ratios is encouraged. Solutions of similar ratios are equally acceptable.

The following changes in grades and ratios have been suggested for future consideration: 1-3-6 (3-9-18) to 1-2-4 (5-10-20); 0-1-3 (0-10-30) to 0-1-4 (0-10-40); 1-3-9 (3-9-27) to 1-2-8 (4-8-32); 1-2-3 (5-10-15) to 1-2-4 (5-10-20).

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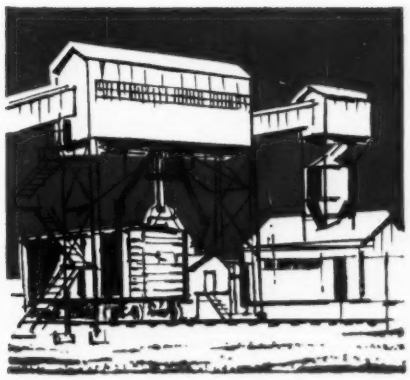

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ABOUT IONS, CATIONS, ANIONS

by Dr. Vincent Sauchelli
Chemical Technologist
National Plant Food Institute

Several readers have requested more information about **ions,** the **cations** and **anions** mentioned in a previous discussion of "ionic balance" in the soil.

What is an ion? Mineral nutrients in the soil are present as ions which are atoms or groups of atoms or chemical elements carrying an electric charge. The charge may be positive (+) or negative (—). Most persons are familiar with the positive and negative convention used in discussions of electricity, as for example the poles of a battery. Those ions carrying a positive charge (+) are called cations and are written with the plus sign as a superscript, one sign for each charge; for example, sodium, its chemical symbol is Na and the cation designation is Na^{x}. If the element carries two positive charges, two plus signs are used; for example, calcium is designated by its cationic symbol Ca+ +. Elements carrying negative electric charge (—) are called **anions,** and anions show the negative sign (—) as a superscript; for example, chlorine, Cl^{-}. Just as in the case of cations, for each negative charge, there will be shown a corresponding negative sign. For example, the anion (PO_4) has three charges and is written $(PO_4)^{---}$.

Roots have the ability to absorb nutrients selectively from the soil. How to explain this function of taking up some elements and excluding others in the same solution has always baffled plant physiologists. Until quite recently it has been, like photosynthesis, one of nature's best kept secrets. But persistent study is bringing some rewards. By means of radioactive ions, E. Epstein of the U. S. Department of Agriculture has reported on results of his investigation which help our understanding of how plants get their nutrients. Epstein believes that we are to regard the root cell membrane as a sort of transportation medium. The membrane is not as formerly believed a sieve-like membrane through whose pores the nutrient elements propelled themselves into the cell tissue. Not so simple. The cell has the power to utilize some of its vital energy to manufacturing and energizing specific chemical compounds in its membrane which act as self-powered ferries to give the selected nutrient elements a free ride across the membrane. The compounds seem able to pick up free ions, transport them, piggy-back like, and to carry them across the membrane and into the cell proper.

These "ferry-compounds" will not pick up any and all elements. It seems they are very "choosey" and each compound seems partial to a certain class of mineral ions. All the ions of one class—for example, cesium, potassium, rubidium—seem to compete among themselves for the limited space on the ferry; but one class or group does not compete with the other classes or groups of ions.

This in a way explains why sodium very often is able to replace potassium. They are not in the same class or group and therefore do not compete for that ferry ride.

All is not harmony in the soil solution. Nutrient elements show antagonisms as well as affinities. For example, calcium (Ca) and potassium (K) are antagonistic and it is important to maintain a specific ratio of K to Ca in the cellsap for normal functioning. And so there is an optimal Ca to H ratio (H=hydrogen) for each pH situation in the soil depending on soil type. In sandy soils this favorable ratio occurs at a pH of 5 to 5.5; in loam soils, at a pH of about 6.0; clay soils, pH 6.5.

Calcium (Ca) and magnesium (Mg) elements are also antagonistic. Soil fertility is definitely influenced by the ratios of these antagonistic ions. The optimal Ca/H ratio for each soil type for example influences the absorption capacity of plants for many trace elements; assures the improvement of the physical. chemical and biological properties of the soil which in turn influences the decomposition of organic matter and the formation of humus, the nitrification of ammonia, conserves clay and favors the building up of a desirable crumb structure of the soil.

Thus, it is evident the interrelationships are many and complex. A balanced ionic state of the soil is one of the most important requirements for the optimal growth and development of the crop plants.

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Below: Horticultural unit of 60 acres devoted to research on crops grown to highest commercial standards.

Right: Picture from the air showing Levington Research Station and surrounding trial grounds covering 400 acres.

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All over the world farmers are producing more food at lower costs. In Britain the farming industry has increased output by more than 60 per cent in response to the Government's call for greater efficiency.

Increased efficiency alone, however, is not enough. Efficiency must go hand-in-hand with lower production costs, so that British home produced food can be competitive with food from Europe.

This is the challenge facing the industry in the post war era, and it will be won by the farmer working in close partnership with science.

The scientific worker has already made an immense contribution to the prosperity of the industry through discoveries in all fields of agriculture. It is upon these discoveries and others yet to be made that the prosperous future of the U.K.'s farming industry will largely depend.

Aware of this, Fisons Limited, the largest manufacturers of chemical fertilizers in Britain, have recently opened Levington Research Station, considered by many experts to be the finest station of its kind in Western Europe.

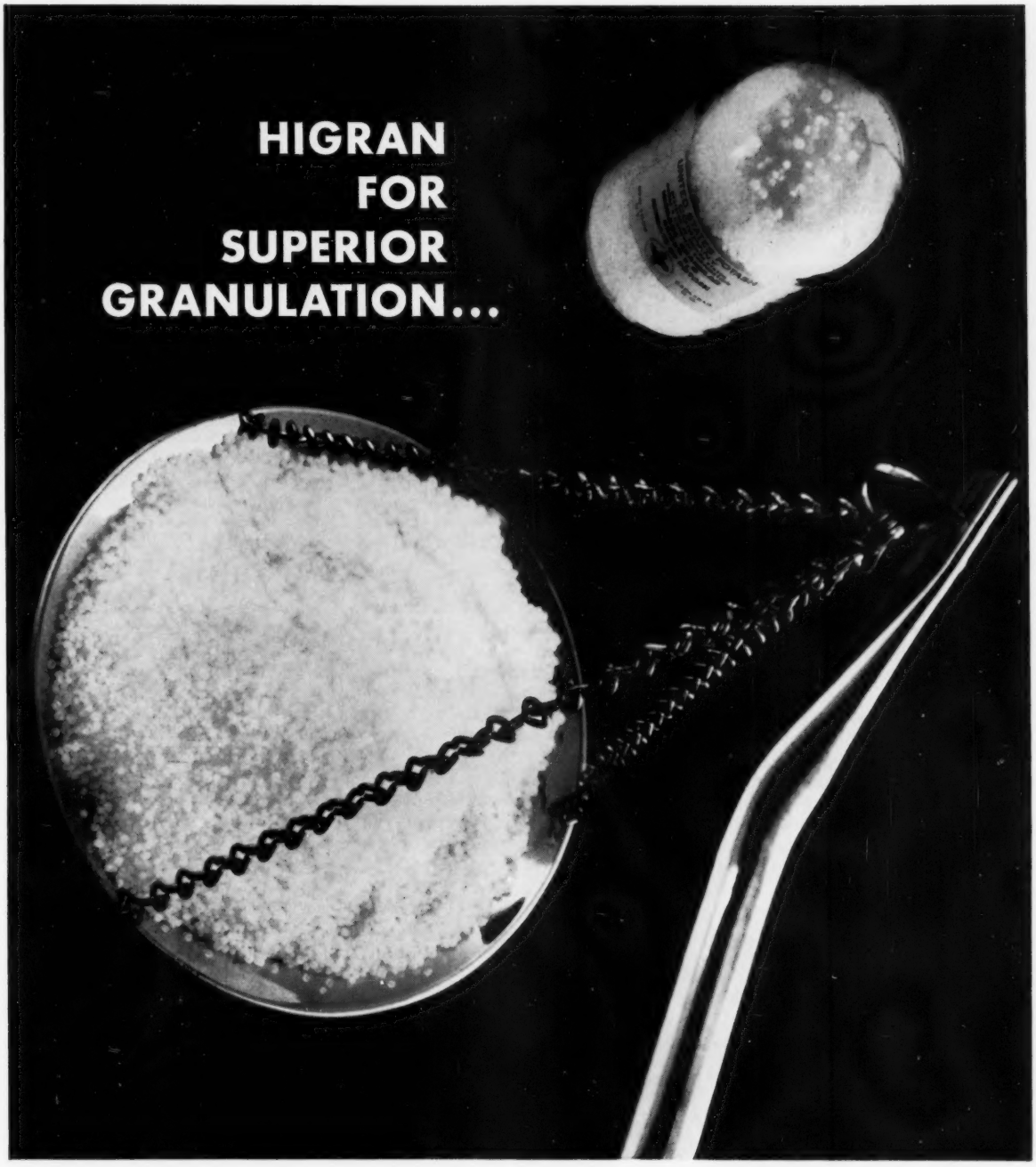
The station is staffed by about a hundred graduate scientists who work under the direction of Dr. J. A. Storrow, M.Sc.Tech., Ph.D., D.Sc. (Manch.) M.I.Chem.E., the Director of the Station, and Dr J. G. Hunter, B.Sc., Ph.D(Glasgow) F.R.I.C., Deputy Director.

The main laboratories and trial grounds cover some 400 fertile acres near Ipswich in the heart of East Anglia. Controlled from Levington are a sub-station at North Wyke in Devon for grassland research and the Bramford Development Station at Ipswich concerned with chemical process development.

The task of the research group is to further knowledge on fertilizer technology and agricultural and horticultural husbandry, and through this work to ensure that the company's products maintain the highest standards and are used for the maximum benefit of the farming and horticultural communities. The Levington buildings consist of a laboratory and administration block, process laboratory, pot trial unit, canteen, garages and stores. In addition to the farmland there is a sixty-acre horticultural unit with glasshouses.

Fundamental research is carried on through the two departments, the department of chemical research and that of soil science. The former deals with new and improved techniques in the manufacture of fertilizers and associated heavy chemicals, and the latter is responsible for instituting research on soil and agronomic problems, especially those related to the proper use of fertilizers in good farming and horticultural practice.

The Chemistry Department at Levington is organised as two research groups covering basic and process research. Each group is sub-divided into sections. There is the analytical section in which experimental fertilizers used by Soil Science Department are analysed for NPK content. In addition, analyses are made of these materials for incorporated pesticide and herbicide content, work which requires the development of new analytical methods. The trend is toward physical as opposed to classical chemical methods. In fundamental research sections, the general objective is to improve present basic knowledge of manufacturing processes and of those physical and chemical properties relevant to the behaviour of fertilizers up to the time they reach the soil. In the process research group, the preparation of novel formulations on the laboratory and semi-technical scale is investigated: intensive research is carried on into the relation between preparative



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method and storage properties of granular materials.

The soil science programme involves the long term study of fundamental principles of primary interest, but many more problems of more immediate concern are also considered, with laboratory studies, pot and field investigations being closely integrated.

At Levington the two farms occupy more than 300 acres. Most of this area is suitable for arable crop experimentation and the farming policy is designed to produce conditions favourable to this. On the remainder there is mixed farming in which winter beef production and a Red Poll dairy herd take their place. Although most of the land is allocated for field experiments, about seventy acres are used for demonstrating the effects of various rates of fertilizer treatment and estimating their profitability in both arable and mixed farming rotations.

Horticulture occupies an important place in research, and there are sixty acres laid down to crops representing the main interests of the industry. Twenty eight acres of apples and pears are grown on the delayed open-centre method, and five acres of blackcurrants and two of strawberries while about two acres of vegetables are grown annually. These crops are produced entirely for research purposes in which the Horticultural Section collaborates with the Field Experimental staff, ensuring that experimentally valid results are related to crops produced to the highest commercial standards.

Field and pot experiments, an essential part of the fundamental and applied studies, link laboratory investigations with farm and horticultural practice. The research farm, the sub-station of 400 acres in Devon for grassland research, the horticultural unit and the company's provincial advisory service throughout the United Kingdom are available for carrying out experiments. The duties of Levington agricultural advisers are, in face, predominantly those of experimental officers. In this way, research projects can be examined in all phases of the heterogeneous mixture of soils and climate which constitutes British farming and horticulture. This season more than 13,000 plots in agricultural and horticultural experiments have been laid down.

In the agricultural programme a wide range of crop nutrient problems and other related subjects are studied. Fertilizers are examined as sources of nitrogen for grass and arable crops. In the study of nitrogen, phosphate and potash requirements of crops, emphasis is placed on the phosphate and potash needed to obtain maximum yield from high nitrogen fertilization.

The question of granule size in compound fertilizers and the value of manganese and other trace elements receives attention to ascertain their value in maintaining soil fertility in present fertilizer practice. Other studies examine the use of insecticides and herbicides incorporated with fertilizers, and investigate means of improving field techniques.

The horticultural programme has fruit experiments concerned mainly with establishment, nitrogen, phosphate and potash nutrition, and the value of chelated iron in correcting iron deficiencey. In glasshouse investigation on tomatoes, cucumbers and carnations, the main interests are sources of nitrogen, rates of application of nitrogen, phosphate and potash and liquid fertilizers. Vegetable experiments study fertilizer as a carrier of insecticides, sources of nitrogen and chelates. The turf research covers grass production, weed eradication as affected by the supply of nitrogen, phosphate and potash, and growth inhibition, together with weed, worm and fungal disease control.

Experiments being carried out in pot trial programmes include the examination of different aspects of plant nutrition, such as the effect of nitrogen source on the uptake of magnesium by grasses, and the value of water solubility and granulation of phosphates in their availability to plants. Nitrophosphates are being examined, as is the agronomic value of dicalcium phosphate. The nitrogen, phosphate and potash requirements of widely differing soils are investigated in conjunction with field experiments in order to correlate the results with laboratory analysis.

The fundamental studies and experimental investigations of materials in the laboratories, pot trials and field units, are supplemented by extensive trials throughout the U.K. controlled by the central staff and co-ordinated by the officers of the agricultural section on land of co-operative farmers.

In establishing this research and development group for fertilizer investigations, the Fison Company has correlated the activities of an unusually wide range of scientists, bringing together those who study the fundamental problems of the whole of the formation and use of the nutrient materials. This correlation has provided a powerful team who can consider modifications of formulation or of manufacturing procedure with their effect on the solid state properties which influence the satisfactory "condition" and stability of the fertilizers and on the solubility and ionic dissociations of the components which govern the availability of nutrient ions to the growing plant. Under one control the research staff can check the value of new ideas through the laboratories to either the pilot-plants for manufacturing processes or to the full-scale field trials in agronomic assessments distributed over the country.

research briefs

The fuss being made about potential crop chemical poisoning makes it especially interesting right now that a way has been found to detect as little as one part of foreign matter in 100,000,000 parts of milk. Rohm & Haas laboratory men have come up with a radioactive method. Thus sprays for animals or their fodder can be checked definitively, as to any menace to people who may drink the milk. We presume research will go further and relieve the minds of the Audubon Society and others who are perturbed about the wild birds.

♦

Starvation is the action which makes some herbicides hill weeds, according to USDA-coordinated work in California and North Carolina. To be more precise, the herbicides destroy or interfere with the ability of the plants to synthesize foods they need for life and growth.

♦

Nitrogen oxide production, for nitric acid, fertilizer and other purposes, has been improved by experiments at Brookhaven National Laboratories. These show that fine glass fibers, into which radioactive uranium oxide has been incorporated, greatly improves the process. As a result, the US Atomic Energy Commission has contracted with Rensselaer Polytech for further research in radiation chemistry.

♦

Soil samples sent in by Future Farmers of America in 1957 set a

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TOPEKA, KANSAS

new record for the New York state soil test lab at Cornell. From more than 2700 farms FFA chapters in 175 schools helped farmers collect more than 14,000 samples, more than a third of all the samples that came in last year. The program was sponsored by GLF, who contributed 40¢ per sample to the FFA chapters, and also paid the $1 analysis fee for samples taken from farms of FFA members and GLF members.

The boys were trained at GLF-organized sessions, with county agents and county vocational agriculture group chairman cooperating. Obviously there are 2700 farms where intelligent fertilizer recommendations may be made.

♦

Congress in an economical mood, and with surplus crops facing everybody, are not likely to look with much favor on budgets for farm production research. USDA's research chief points out that it takes all the research we can afford these days just to keep the farmer abreast of technological changes in farming. Pests, for example.

♦

Farm newsreels began to appear on TV stations middle of last month. These emphasize farm news as it is being made, with spot interviews, features of many kinds that will keep the farmer aware of what is going on in his increasingly complex field.

♦

Combined fertilizer and weed killer . . . that's liquid nitrogen, according to the North Carolina AES. Applied as a spray at lay-by time, it does a good job of burning weeds, and then supplies plant food to corn.

♦

Nursery stock research conducted by the Mississippi AES has begun to show the very different technic demanded by this "crop" as compared with field grown crops. Planting in containers lengthens the season and spreads the labor load more evenly, but brings on questions of how often and how much to fertilize. Size of containers, length of time in them, selection of plants for container growing . . . these are just some of the problems being studied. As Commercial Fertilizer has pointed out, the growing market for specialty plant feeding makes this a subject of wide national interest.

♦

Canada's experimental farm at Agassiz, B. C. has proven that the rates of fertilizer commonly applied to canner corn, grown on unmanured land, are too low for maximum economic returns.

♦

Corn acreage which produced 87 bushels in 1956 grew 140 bushels per acre in 1957 at the West Tennessee AES. The corn was Dixie 29. Stalks had been disked in prior to winter. The field was planted in April, with fertilization begun at planting time. 200 pounds of 6-12-12 were applied in bands 3 inches to the side and just below seed level. Seed was planted at 12,000 to 14,000 plants per acre. A pound of heptachlor was applied at planting.

After the first tractor cultivation in May, 300 pounds of ammonium nitrate per acre was applied.

♦

Rice responds well to fertilizer drilled into the soil before flooding, U of Cal's Davis station reports. Nitrogen drilled in rows now more than 14 inches apart, at 60 pounds per acre, boosted yields 105% over unfertilized land. They say the N should be applied no longer than a week before flooding, and should be placed 2 to 4 inches deep.

♦

Sweet Potatoes produced more than $10,000 from three acres last season at Umatilla, Florida. The average yield for the state is only 70 bushels per acre, and this grower produced an average of 742 bushels of #1 potatoes per acre.

The site was near a lake, so had plenty of moisture. The land had never grown this crop, so weevil damage was minimized. Each acre got 1000 pounds of 4-7-5. The land was limed to a pH of 5.5. During the season four sprays of DDT and wettable sulphur kept the vines free of insects and diseases.

♦

County Agents in the West are busy riding herd over the new planting season. For example, out in Washington, the application of boron early is being advocated, with the advice to apply to alfalfa "now" which was the middle of last month, and on other crops soon, in order to let the rains wash it down to the root zone.

The alfalfa prescription called for 40 to 50 pounds of borax . . . followed by similar applications every other year.

♦

The Northern Great Plains Field Station points out the use of nitrogen will create rapid range improvement, longer grazing periods and better distribution of livestock over grazing areas.

Committee Urges Broad Soil, Water, Fertilizer Studies

A program of broad studies on the complex soil and water conservation problems facing the Nation was urged by the U. S. Department of Agriculture's Soils, Water, and Fertilizer Research Advisory Committee at its recent annual meeting in Washington.

The committee named research in watershed runoff, irrigation efficiency, cropland moisture conservation, and water movement in soils as among the most pressing needs in the area of work reviewed.

In commenting on watershed runoff research, the committee noted that need has developed in recent years for accurate hydrologic records on areas containing less than 100 square miles. The committee said that new information is needed on the relations of water yield and flood flows to precipitation, physical characteristics, and land use and treatment in these small watersheds.

Irrigation-efficiency studies were urged by the committee to develop methods of reducing water losses and applying and distributing irrigation water on western farm lands. Present irrigation practices in the West, the committee said, commonly result in the loss of a major part of water diverted from streams for irrigation. The only promise of solving water problems in many parts of the West lies in more efficient use of existing supplies of water.

Cropland moisture conservation studies were recommended in humid areas, lying generally east of the Mississippi River. Determinations are needed, the committee said, on the amount of water lost by evaporation, the runoff after tillage operations from different types of soils, and the water economy of winter cover crops.

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Typical of the top participants in Spencer Chemical Company's Efficient Corn Growing Program are these two Missouri Vocational Agriculture students with their instructor. They were among the more than 2000 participants in this year's Spencer program which stresses "learning by doing" in the efficient production of corn.

Spencer Contest Assists In Proving Plant Food Values

For the fourth consecutive year farm youths from the Midwest and South have demonstrated that they can be really efficient when it comes to growing corn. Representing 17 states, and almost every corn growing situation in the book, a group of 231 Vocational Agriculture students averaged 99 bushels per acre on acre test plots which dotted the landscape between Minnesota and Mississippi and Missouri and South Carolina.

In growing corn the youths, all participants in an Efficient Corn Growing Program sponsored by Spencer Chemical Company, were competing with themselves to see just what could be done to improve their regular corn growing methods. Their success was measured by balancing the improvement in yield and profit on one acre of corn grown with what the boy judged to be "improved" practices against the yield and profit from a "check" acre grown with practices normally used.

Early last month 43 of the top participants in the program gathered in Kansas City and Memphis as guests of Spencer to compare notes on what it takes to be an "efficiency expert" in growing corn. Some of the statistics they came up with were these: Plant food application was increased on the "improved" plots. Nitrogen went from 26 pounds per acre on the "check" plot to 69 on the "improved" plot. Potassium went up from 27 to 53 pounds per acre and potash from 27 to 51 pounds.

Other factors mentioned by the boys as yield "boosters" were increased plant population (averaged 13,100 plants per acre on the "improved" plot, 11,480 on the "check"); use of better adapted hybrid seed, and increased use of pesticides.

Because they were required to keep accurate records and make specific yield measurements in the Spencer program, the boys came up with these "efficiency" statistics. Average yield per acre increased 22 bushels on the "improved" plot. Production costs went up about $13 an acre due to increased use of fertilizer, better seed, etc., but cost per bushel went **down** due to the increased yield—and most important of all, net profit per acre went up to $50.61—a profit increase of $11.22 over the less costly, but also less efficient "normal" practices plot.

Spencer's Efficient Corn Growing Program, a "learn by doing" activity for farm youths studying Vocational Agriculture, had more than 2,000 participants in this, its fourth year. Records of those completing the program are screened to select the boys who are tops in efficiency. These boys, together with their Vocational Agriculture Instructors, are then invited to be guests of Spencer for a 3-day, expense-paid trip to Kansas City or Memphis.

Bemis Plans Centennial Year

The 100th anniversary of the founding of Bemis Bro. Bag Company will be observed throughout 1958 with activities designed to emphasize the company's basic anniversary theme—"Entering our second century of skill, vision, and progress."

In outlining his company's centennial year program, President F. G. Bemis said, "We will honor what has gone before, but, in large measure, we will do so by rededicating our company to its second century."

CFA Convention November 9-11

The Thirty-fifth Annual Convention of the California Fertilizer Association will be held at the Ambassador Hotel, Los Angeles, on Sunday, Monday and Tuesday, November 9, 10 and 11, 1958, it was announced by William G. Hewitt, Association President. Between 500 and 600 are expected to attend.

The CFA Board of Directors named the dates and chose this location for the 1958 Convention at a meeting held in San Francisco on January 17. Hewitt said the Convention is customarily held in even-numbered years in Southern California, and in alternate years in Northern California.

John Hooper of Wilson & Geo. Meyer & Co., Los Angeles, is Chairman of the Convention Program Committee. Other members of his Committee are Thomas Barnard, Newport Beach; Frank Scoville, Chula Vista; Clark Sumner, South Gate; and Dexter Thompson, La Canada.

Thomas Lathe, also of Wilson & Geo. Meyer & Co., Los Angeles, is Chairman of the Entertainment Committee. Assisting him are Robert J. Gigler and Frank McGrane, both of Los Angeles.

Mrs. Frank McGrane of Arcadia is Ladies Committee Chairman, assisted by Mrs. Mel H. Howard of Rolling Hills, and Mrs. Murray C. McNeil of San Marino.

James F. Sloan, President of the J. F. Sloan Company, Salinas, was elected to the Board of Directors of the California Fertilizer Association at a meeting in San Francisco on January 17.

Sloan's election brings to full strength the twelve man Board. Other Directors of the Association are Jack Baker, Bandini Fertilizer Company, Los Angeles; Lowell W. Berry, The Best Fertilizers Company, Oakland; Fred R. Bryant, Brown and Bryant, Shafter; Frank A. Easton, Sunland Industries, Inc., Woodland; Howard H. Hawkins, Golden State Plant Food Company, Glendora; William G. Hewitt (C. F. A. President), Pacific Guano Company, Berkeley; Earl R. Mog, Growers Fertilizer Company, Stockton; Arthur W. Mohr, California Spray-Chemical Corporation, Richmond; M. M. Stockman, The Mountain Copper Company, Ltd., San Francisco; and John N. Williams, General Fertilizer and Supply Company, Chula Vista.

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More Pasture and Less Food Crop Can Fight Surplus

American farmers need to put more land into hay and pastures and raise less food crops and feed grains if they are to solve the surplus problem, according to University of Minnesota agronomist W. M. Myers.

Diverting more acres to grass would mean more beef production, since forages can't be used to any great extent for pork, or as food crops. This, he said, would result in less total food from each acre eventually reaching the supermarket.

Such diversion "would be a powerful tool in bringing production and consumption back into balance," Myers stated. "Government agricultural programs could be designed that would accomplish this objective."

Myers, who is head of the University's agronomy department, spoke at a Feed and Seed Industry Research conference in Chicago recently. He said a shift to more forages is also necessary to conserve and improve soil, to allow for changing eating habits of American people and to provide more meat at less cost.

"More forage feeding means cheaper livestock products, which also would mean more of our total agricultural production consumed in this form than as crops," said Mr. Myers.

He said that surplus food, feed grain and cotton crop acres need to be used for other crops. But he added that since there are no new industrial crops in sight with great potential use, forage crops "are the only logical possibility."

"In the corn belt, an acre of corn used to feed hogs, if converted to an acre of grass for beef, would shrink food calories per acre by 75 percent. An acre yielding 80 bushels of corn would produce about 700 pounds of pork. The same acre in grass would produce about 165 pounds of beef." This line of reasoning, Myers added, has been promoted recently by Herrell De Graff, Cornell university food economist.

Myers pointed out that total red meat consumption per person was 20 pounds higher in 1953 than in 1929, and jumped another 7 pounds per person by 1955. Most of this increase was in beef. Consumption of dairy products, potatoes and sweet potatoes and wheat went down sharply during the same period.

Therefore, Myers said, switching from food crops to forage for more beef production would decrease total amount of food produced per acre and at the same time take advantage of modern eating habits.

He questioned, however, whether the increasing rate of American agricultural production would more than offset population increases by 1975.

"At the present rate of population growth, the 1975 population will exceed that of 1951-53 by more than one third," he said. "If this happens, our projected food needs are too low.

"During the war, farmers put to use accumulated information developed but relatively unused through a half century of research. But there is great doubt whether we have an equal reservoir of unused information and materials today for farmers to use in increasing per acre production levels in the years ahead," said Myers.

Myers said the expanded production of grain and intertilled crops in recent years has increased the drain on our land. Prospects for increased population in the future, he said, mean that "we can't afford to continue losing cropland in the future, as we are at present, at the rate of a half million acres a year, through water and wind erosion."

For maximum conservation of land, he said, we must have greatly increased acreages of forages and sharp reductions in acres of food crops, feed grains and other soil-depleting crops.

New Bulletin Offered On Pelleting Machine

Availability of a revised bulletin describing Industrial Model 501-G Pellet Ace has been announced by Sprout, Waldron & Co.

Bulletin 182-A employs engineering drawings and cutaway photos to illustrate how the design of this precision built industrial model assures maximum efficiency. A list of typical products pelleted is included along with the design, engineering and application data. Copies may be obtained from Sprout, Waldron & Co., Inc., Muncy, Pa.

R. M. Wilbur, right, general manager of the Coronet Phosphate Co., accepts for the second consecutive year the Ralph B. Douglass trophy awarded annually to the Smith-Douglass division with the best safety record. Twelve divisions compete for the traveling award. Making the presentation is H. H. Van Bockel, safety and personnel director at Coronet's Plant City, Florida, plant which completed 1957 without a lost time accident. Since the last lost time accident in December, 1956, 443,524 man hours have been worked without a disabling injury.

THE REAL SAVING IN SAFETY

It should be made clear that the cost of industrial accidents is always paid by the employer and not an insurance company. Many employers insured under the Workmen's Compensation Act in North Carolina wrongly believe, under the compensation coverage, they have nothing to worry about from the standpoint of accident cost. This is not the case.

It is the responsibility of the insurance company to pay the worker or his dependents after the accident has occurred. The insurance companies endeavor to make the payments justly and fairly since the money has been entrusted to their care in the form of insurance premiums.

Understanding the relationship of the policyholder to the insurance company is simplified if we consider the insurance company as an agent acting for the policyholder for a percentage of the premium dollar.

The cost of industrial accidents does not end with the payment of the injury claim. The hidden cost is indirectly paid for by the employer. This uninsured cost may vary. Some of our industrial accident prevention writers claim that the hidden cost runs as high as the ratio of five to one.

Some items involved in the hidden cost is loss of production, damage to material, loss of time and loss of morale to the employees.

—From North Carolina Industrial Commission Safety Bulletin

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PEOPLE IN THE INDUSTRY

GRAHAM MANAGER AT FORT SMITH

H. E. (Cotton) Graham, who was production manager of Fort Smith Cotton Oil Company, Fort Smith, Arkansas, has been appointed as manager of the fertilizer division of that company.

SMITH HEADS ESCAMBIA RESEARCH

Dr. W. Mayo Smith has been appointed director of research for the Escambia Chemical Corporation, Robert U. Haslanger, president, announced today.

Dr. Smith has served as Assistant Director of Research in charge of polymerization and plastics research and development since April, 1956.

Escambia's Research and Development activities, now conducted at Cambridge and Newton, Mass., will be moved late this spring to the new Escambia Research Center in Wilton, Conn., where Dr. Smith will be in charge.

VC ELECTS FOUR MEN

David K. Wilson of Nashville, Tennessee, president of Cherokee Insurance Co., and Oliver Russell Grace, a partner in the New York securities investment firm of Sterling, Grace & Co., have been elected to the Board of Directors of Virginia-Carolina Chemical Corporation.

At the same time, the V-C board announced the election of Russell L. Haden, Jr. as vice president and Richard E. McConnell as treasurer.

Mr. McConnell, who has been secretary of the company since 1956, succeeds Irving D. Dawes, who retired at the end of last year after 27 years with the firm.

Mr. Haden, who was named general manager of the chemicals division in December, was general manager of the organic chemicals division of Dewey & Almy Chemical Co., Cambridge, Massachusetts, before moving to V-C as a replacement for Edwin Cox, who retired as vice president for chemicals.

FEDERAL ANNOUNCES 3 IN SALES MANAGEMENT

To realign and strengthen their general sales management, Federal Chemical announces the following appointments effective February 1, 1958: T. M. Dues and D. T. Morris as assistant general sales managers; W. N. England, division sales manager, Louisville division.

NATIONAL POTASH RETAINS SANDERS AS CONSULTANT

Omar Sanders has been retained by National Potash Company to assist in its sales activities, it was announced by William B. Porterfield, Vice President and Sales Manager.

Mr. Sanders has been associated with the fertilizer industry for forty years. After sixteen years with Armour Fertilizer Works, Mr. Sanders became manager, in 1934, of the newly formed Fertilizer Industries, Incorporated. He remained in this position until his retirement last June.

The appointment of Ray L. Hobbs as Chief Engineer of The Best Fertilizers Co. was announced by Lowell W. Berry, president. Mr. Hobbs will be in charge of all maintenance and new construction engineering in the present plant at Lathrop, as well as in the new anhydrous ammonia plant now being built.

Lowell W. Berry, president of The Best Fertilizers Co., has announced the appointment of Col. Thomas C. Compton, USA (Ret.) as his executive assistant. Col. Compton retired from the Army on December 31, 1957 after more than 20 years service. Col. Compton will initially be located at the Oakland office. A move to the Lathrop, California, plant and office is planned for later this year.

THREE APPOINTMENTS BY DU PONT POLYCHEMICALS

The Chemicals sales division of Du Pont's Polychemicals Department has announced new positions for Dr. Myers F. Gribbins, Jac O. Ullman, and Dr. Frank G. Keenen.

Dr. Gribbins, formerly assistant sales manager of the nitrogen products section, has been named manager of the ammonia products section. Mr. Ullman, former product specialist with the plastics sales division, replaces Dr. Gribbins. Dr. Keenen moves from the post of manager of the ammonia products section to associate laboratory director for the department's sales service laboratory at Chestnut Run, near Wilmington.

Dr. Gribbins joined Du Pont in 1942; Mr. Ullman joined them in 1937; Dr. Keenen joined the company in 1926.

RAY TO MOBILE FOR BEMIS

The Bemis Bro. Bag Co. has appointed W. J. Ray to succeed C. E. Hayward who has retired as manager of the company's multiwall bag plant in Mobile, Alabama.

Mr. Ray, former supervisor of multiwall bag sales and a member of the St. Louis General Sales Division, was named assistant manager of the plant last year.

VELSICOL ADDS NOONAN AND SCHULZ

Richard E. Noonan was recently appointed marketing specialist by Velsicol Chemical Corporation. He will headquarter at the Velsicol's Chicago offices, but will

Sherman W. Clark, manager of the agriculture department of Texas Gulf Sulphur Company, who has been appointed chairman of the Houston Chamber of Commerce agriculture committee.

travel extensively in key market areas, assisting formulators, distributors and dealers in their own promotion efforts on Chlordane.

Kenneth L. Schulz has been appointed technical sales representative for Indiana and Illinois by Velsicol. Mr. Schulz has joined the Agricultural Chemicals Division and will be responsible for sales of the company's line of insecticides and solvents in his territory. He will headquarter in Lincoln, Illinois.

CHRISTENSEN JOINS O-M SALES

Maurice A. Christensen has been named field representative for the Plant Food division, Olin Mathieson Chemical Corporation. Lawrence S. Madsen, general manager western district announced Mr. Christensen will service farm accounts with agricultural chemicals in the Chandler, Ariz. area.

Before joining Olin Mathieson, Mr. Christensen was agronomist for the Hanna Ranch in Chandler. Prior to that he had been with the Soil Conservation Service in the same city for five years.

McKEOWN HEADS AAC CHEMICAL CONTROL LAB

The American Agricultural Chemical Company has announced that A. P. McKeown, formerly chemist at its Pierce, Florida Chemical Control laboratory, has become responsible as chief chemist of the Chemical Control laboratory at Carteret, New Jersey.

PENROD JOINS MICHIGAN CHEMICAL

Michigan Chemical Corporation, Saint Louis, Michigan, has added James Q. Penrod to its research staff. Announcement of his appointment has been made by Dr. Dwight Williams, director of research.

Mr. Penrod is assigned to the inorganic group where he will be engaged in developmental work on rare earths.

SIVORI MANAGER FULTON DEPARTMENT

Frank C. Sivori has been appointed Manager of Textile Sales Service for Fulton Bag & Products Company, it was announced by Jason M. Elsas, President. He has had over 25 years of service in the textile product field—including tarpaulins, canvas items, brattice cloth and textile bags of all kinds.

AP&C ELECTS HEFLER, MARSIC, DeARMOND

Frederick Marsic has been elected secretary of American Potash & Chemical Corporation and Henry DeArmond assistant secretary, according to announcement by Peter Colefax, president. The officers were named following election of Richard J. Hefler, formerly company secretary and assistant to the president, as vice president in charge of finance.

VELSICOL APPOINTS DR. SCHWEIKER

As part of a general expansion in research and product development, Velsicol Chemical Corporation has appointed Dr. George C. Schweiker to the new position of manager of research. Velsicol's director of research, Dr. W. P. Utermohlen, Jr., announced that Dr. Schweiker will be responsible for the basic research programs of the Velsicol Research and Development Department. These will encompass areas of agricultural and industrial chemicals, polymers, organic processes, and other new fields of interest.

LONG ELECTED FREEPORT DIRECTOR

Augustus C. Long, chairman of the board of directors and chief executive officer of The Texas Company, has been elected a member of the board of directors of Freeport Sulphur Company, Langbourne M. Williams, president, has announced.

SUPERIOR NAMES DIXON FLORIDA EAST COAST REP.

An additional field representative who will spend a large part of his time on the East Coast has been announced by Superior Fertilizer Company of Tampa and Fort Pierce.

Ben Dixon, formerly with SCS at Okeechobee, was named in the announcement from G. D. Sloan, Superior president.

UNION BAG-CAMP APPOINTS LOUDIN

Union Bag-Camp Paper Corporation has announced appointment of Blaine Loudin as multiwall bag sales representative covering eastern Pennsylvania and southern New Jersey.

JOSEPH CORRIGAN NAMED VICE PRESIDENT

Joseph W. Corrigan has been named vice president of the J. C. Corrigan Co., Inc. of Boston, engineers and manufacturers of conveying systems. Announcement was made recently by the president, J. C. Corrigan.

MARKS HEADS FERRO CORP.

Harry T. Marks, executive vice president, has been eelcted president of Ferro Corporation, it was announced by Robert A. Weaver, Board Chairman and chief executive officer of the Cleveland concern. Mr. Marks, a 25-year veteran of Ferro, will continue to carry out his present duties while assuming the position made vacant early this month by the sudden death of C. D. Clawson, Mr. Weaver stated.

U. S. Potash has announced the appointment of Ben Mills Allen of Atlanta, Ga., as sales representative in their Southeastern territory. Mr. Allen will work directly under Robert H. Walton, manager of the Atlanta office and will be assigned duties in the territory served by this office.

Henry E. Wessel, former manager of marketing research for the research and engineering division of Monsanto Chemical Company, who has been named assistant to the general manager of Virginia-Carolina Chemical Corporation's fertilizer division.

Parker S. Dunn, vice president, manufacturing, of American Potash & Chemical Corporation, who has been elected to the company's board of directors, according to an announcement by Peter Colefax, president. The board was increased from eight to nine members.

International's new granular

Either way, you get all the sales-power of International's non-crumbling, free-flowing granular Triple

Here's a new granulated Triple Superphosphate with a twin purpose in life. It's tailor-made for ammoniation in manufacturing your mixed goods . . . an ideal direct application granular for your private label, or selling in bulk.

International's special processing produces a unique sponge-like structure that facilitates ammoniation and contributes to desirable granular texture in your mixed goods.

What's more, these uniform-sized, non-crumbling, free-flowing granules are ideal for direct application. They won't bridge over in a fertilizer drill . . . won't crumble during handling or spreading. And every ton brings you a guaranteed minimum of 46% APA.

Your International man can show you how this new granular triple helps you meet the demand for higher analysis granular fertilizers — in manufacturing mixed goods . . . or when bagged under your own label as 0-46-0 . . . or selling for direct application in bulk.

Triple Super...

it...

label it

and it ammoniates!

There's no other granular triple super like it in the industry. Non-crumbling granules have sponge-like structure for better ammoniation... flow free for direct application. Write or wire for full information.

INTERNATIONAL MINERALS *International* MINERALS CHEMICALS **& CHEMICAL CORPORATION**

PHOSPHATE CHEMICALS DIVISION .... 20 N. WACKER DRIVE, CHICAGO 6, ILL.

Appointment of Harold C. Doellinger as assistant to the chairman of O. M. Scott & Sons has been announced by Charles B. Mills, chairman. Mr. Doellinger joined Scotts in 1939. In his new assignment he will be Director of Statutory Labeling.

Nitrogen Division, Allied Chemical & Dye Corp., has announced the appointment of George B. Meredith (top, left) as vice president in charge of production; Frank O. Agel (top, right) as vice president in charge of development; Dr. Harvey J. Stangel (lower left) to the newly created position of chief agronomist; R. M. Jones (lower right) as director of technical service, succeeding E. W. Harvey, who retired January 1.

Clarence E. Elsas, president, Fulton Bag & Cotton Mills, Atlanta, Georgia, has announced the appointment of Meno Schoenbach as advertising and sales promotion manager, with headquarters in Atlanta. He also will be responsible for the Company's public relations program. Mr. Schoenbach joined the Fulton organization in 1954 and has been in New Orleans, La., for the past two years.

Stafford L. Beaubouef, who is now Southern sales supervisor for the Grand River Chemical Division of Deere and Company has been announced by John R. Taylor, Jr., sales manager. In his new position he will headquarter at the plant's general offices in Pryor, Okla. Rush E. McCarty has been appointed to replace Mr. Beaubouef as sales representative for the company's nitrogen products in the Arkansas, Louisiana and East Texas area.

changes

Diamond

Diamond Alkali will step out of the Pine Bluff, Ark., chlorine-caustic plant it has been leasing for the Army. It has sold the former V-C Diamond Black Leaf division to a new corporation, Black Leaf Products of Chicago. Diamond expects the Deer Park and Muscle Shoals plants will produce chlorine more efficiently, and easily replace the Pine Bluff facilities.

Foster Wheeler

A new Japanese concern to design, build and sell petrochemical plants has been organized by New York's Foster Wheeler and Tokyo's Ishikawajima Heavy Industries. The name—Ishikawajima Foster Wheeler.

Dairyland

The Bowman Dairy Co. plant at Marshall, Wis. has been bought by a concern, Dairyland Fertilizers, which expected to go into production of granular fertilizers, in bulk and bags, the first of this month. Officers are Ray L. Pavlak, recently plant foods manager for Wisconsin Farm Bureau's Farmco division, president and treasurer; James B. Harker, vice president and sales-manager; Mrs. Pavlak, secretary; John J. Walsh, assistant secretary. Mr. Pavlak was for 11 years Green county agent.

Emulsol

Emulsol Chemical has opened a new sales office in Akron, O. Ohio, Western Pennsylvania, Upper New York, West Virginia and Eastern Kentucky will be handled by T. William Mather who will make the new office his headquarters.

IM&C Launches Institutional Advertising

International Minerals & Chemical Corporation launched a corporate promotion campaign in February designed to gain added recognition in the business community for the progressive, growth character of the company and the importance of its product family.

"Living Minerals" is the theme of 21 four-color full-page and double spread insertions scheduled for Time, Newsweek, and Business Week between February 17 and November 29.

Dominant feature of the promotion will be micrographic reproductions in full color of "Living Mineral" from the long list of minerals mined and processed by IMC. The campaign will play up the vital "living" roles of IMC minerals, some as literal necessities for animal and plant itself and others as important contributors to items of everyday living.

Louis Ware, president of IMC, calls the campaign a "fresh approach—an unusual and compelling one which vividly presents the scope of the company.

"We at International Minerals deal with wonderful, exciting things every day," Mr. Ware said, "and not enough people know that the minerals we take from the earth affect the lives of nearly every living thing.

"We have a research group that is working hard toward constant expansion of the usefulness of these wonderful products. Recognition of our present stature and growth potential is essential to realization of the full potential of our company and its products.

"We expect this campaign to help achieve such recognition."

SEND FOR YOUR BOOKLET

"The Installation and Operation of a Nitrogen Solution System" to P. O. Box 4628, Atlanta 2, Ga.

KNOW you are RIGHT and get

A COMPLETE PACKAGE

NO PROBLEMS by ordering from one source

NO WORRIES Our System has no flaws

Nitrogen Solution System

We have been handling Nitrogen Solution problems for 20 years. Don't depend on a source who knows nothing of your problems. We can give you tested and guaranteed valves, pipe, fittings and all the miscellaneous items you need on one order. Call, Write or Wire J. A. (Joe) Naylor and know you are right.

J. M. TULL METAL & SUPPLY COMPANY, INC.

285 Marietta St., N. W. **JAckson 5-3871** **ATLANTA 2, GA.**

Branch Warehouses

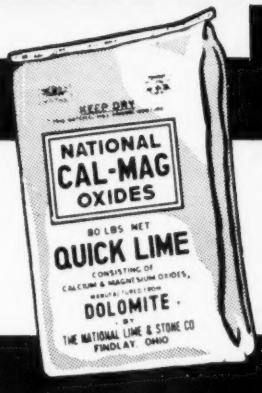
BIRMINGHAM **JACKSONVILLE** **MIAMI** **TAMPA**

STEDMAN S Fertilizer Plant EQUIPMENT

Established in 1834

- All Steel Self-Contained Fertilizer Mixing and Bagging Units
- Complete Granulating Plants
- Batch Mixers—Dry Batching
- Pan Mixers—Wet Mixing
- Tailings Pulverizers—Swing Hammer and Cage Type
- Dust Weigh Hoppers
- Vibrating Screens
- Acid Weigh Scales
- Belt Conveyors—Stationary and Shuttle Types
- Batching Systems
- Bucket Elevators
- Hoppers and Chutes

STEDMAN FOUNDRY & MACHINE COMPANY, INC.
Subsidiary of United Engineering and Foundry Company
General Office & Works: AURORA, INDIANA



NATIONAL CAL-MAG OXIDES
NOW IN TWO SCREEN SIZES

MgO 40.39 – CaO 58.07 – TNP 203.88

Superior for Dehydrating, Neutralizing, and Curing factors in the preparation of effective fertilizers.

PROMPT SHIPMENTS

Three railroads serve our Carey, Ohio, plant — assuring prompt delivery — everywhere.

WRITE FOR COMPLETE INFORMATION TODAY! Dept. CF

We Also Produce
DOLOMITIC HYDRATED LIME (165 TNP)
and
KILN DRIED RAW DOLOMITE (107 TNP)
Screened to size

The NATIONAL LIME and STONE CO.
General Offices • • • • • FINDLAY, OHIO

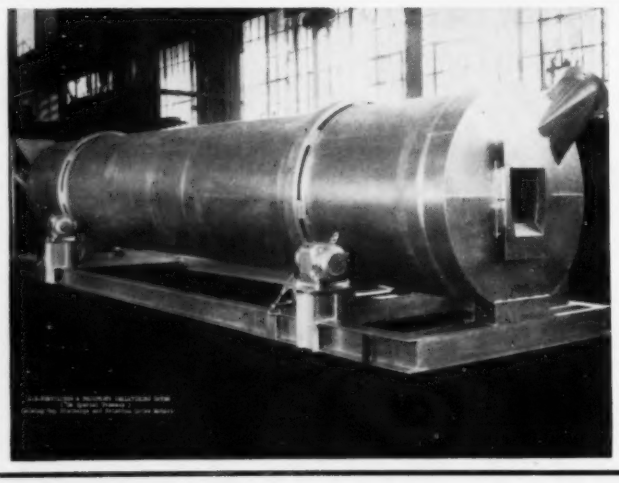
WE ARE HERE TO STAY

THE MANITOWOC SHIPBUILDING INC. HAS BEEN HERE SINCE 1903 MANUFACTURING NOT ONLY SHIPS—SUBMARINES, BARGES AND TANKERS BUT DUST COLLECTORS, DRYERS, COOLERS AND SPECIAL EQUIPMENT. OUR LIST OF SATISFIED CUSTOMERS READS LIKE **WHO'S WHO** IN AMERICAN INDUSTRY.

WE INTEND TO STAY IN THE FERTILIZER MACHINERY BUSINESS

WE REALIZE IT IS A SPECIAL BUSINESS OF ITS OWN, SO WE HAVE SET IT UP AS A SEPARATE DIVISION, STAFFED BY MEN EXPERIENCED IN THIS FIELD. THEIR TIME AND RESEARCH IS DEVOTED EXCLUSIVELY TO YOUR BUSINESS.

THE SAME POLICY WE HAVE FOLLOWED FOR 55 YEARS WILL APPLY TO THIS DIVISION.—THE POLICY OF BUILDING GOOD EQUIPMENT, OF SUPERIOR, ADVANCED DESIGN, AND THEN BACKING IT UP, TO ASSURE YOU SATISFACTION.



THIS IS THE POLICY THAT HAS ENABLED US TO SATISFY THE UNITED STATES GOVERNMENT AS WELL AS THE MAJOR CHEMICAL, CEMENT AND PAPER COMPANIES ALL OVER THE WORLD.

OUR FERTILIZER DIVISION IS STAFFED WITH EXPERIENCED MANUFACTURERS OF FERTILIZER PLANTS AND EQUIPMENT WHO UNDERSTAND YOUR PROBLEMS.

FOR FURTHER INFORMATION, WRITE OR PHONE

R. W. PHILLIPS

CHEMICAL ENGINEERING SERVICE DIV. OF

(ORIGINALLY GREEN BAY, WIS.)

MANITOWOC SHIPBUILDING, INC.

MANITOWOC, WISCONSIN, U. S. A.

CF Staff-Tabulated TONNAGE REPORTS

FERTILIZER TONNAGE REPORT (in equivalent short tons) Compiled by Cooperating State Control Officials and Tabulated by COMMERCIAL FERTILIZER Staff

STATE	January		December		Oct.-Dec. Qtr.		January-June		July-December		YEAR (July-June)	
	1958	1957	1957	1956	1957	1956	1957	1956	1957	1956	1956-57	1955-56
Alabama	.....	20,141[1]	14,802	14,371	96,046	101,280	808,900	872,550	172,721	174,623	983,607	1,042,416
Arkansas	.....	13,161[1]	4,898	8,555	17,829	26,759	265,265	299,172	62,752	59,915	325,150	359,471
Georgia	34,593	33,574	45,239	49,063	169,097	168,751	980,824	988,454	269,529	253,559	1,234,383	1,244,422
Kentucky	.....	53,927[1]	12,716	7,036	47,868	52,013	451,083	441,481	86,840	90,284	541,367	529,600
Louisiana	6,779	10,761	6,449	8,295	32,419	46,979	200,277	217,343	64,192	71,129	271,406	273,688
Missouri	.....	27,720[1]	31,484	30,887	142,402	154,331	460,487	444,230	330,o95	331,343	791,830	800,471
N. Carolina	.....	74,933[1]	31,187	43,325	127,141	148,970	1,300,353	1,324,267	199,446	216,234	1,516,587	1,649,449
Oklahoma	4,110	3,683	2,426	2,470	21,604	29,343	52,836	65,854	51,436	54,509	107,345	135,396
S. Carolina	25,022	39,286	20,270	23,216	68,388	79,910	694,571	743,670	116,874	122,929	817,500	863,617
Tennessee	5,053	6,492	6,000	8,298	66,286	82,976	383,457	378,626	135,717	141,181	549,253	532,886
Texas	24,498	34,255	33,144	31,736	104,683	130,969	392,770	372,695	213,801	202,406	595,176	566,399
California	(reports compiled quarterly)				.....	231,361[1]	663,484	639,377	.....	412,747[1]	1,079,748	1,001,554
Virginia	(reports compiled quarterly)				66,405	78,509	600,158	599,111	140,784	154,075	754,223	761,820
Indiana	(reports compiled semi-annually)						781,268	807,981	.....	305,917[1]	1,087,185	1,063,049
Iowa	(reports compiled semi-annually)						.....	315,329[1]	.....	85,147[1]	.....	445,329[1]
Michigan	(reports compiled semi-annually)						.....	443,908[1]	.....	184,763[1]	.....	*
New Hampshire	(reports compiled semi-annually)						15,730	13,168	.....	3,253[1]	18,983[1]	*
Washington	(reports compiled semi-annually)								.....	55,709[1]	.....	76,660[1]
Oregon	(report issued annually)								.....	62,147[1]	.....	*
TOTAL	100,055	128,051	208,615	227,252	960,168	1,100,790	8,051,463	8,207,979	1,844,787	1,872,187	10,654,760	10,824,238

.....(not yet reported) * Not compiled [1] Omitted from column total to allow comparison with some period of current year.

MARKETS

ORGANICS: Demand for fertilizer grade organic ammoniates continues good and supplies of Nitrogenous Tankage are heavily booked for the season. Some producers are sold out through May at prices ranging from $3.50 to $4.25 per unit of Ammonia, bulk, f.o.b. production point, depending on the location of the producer.

SEWAGE SLUDGE: A midwestern material continues at $3.10 per unit Ammonia and 50¢ per unit APA bulk, f.o.b. production point. A southwestern material is at $2.75 per unit Nitrogen and 50¢ per unit APA f.o.b. production point, bulk, carlots.

CASTOR POMACE: Limited supplies of imported material have been quoted recently at around $39.25 per ton f.o.b. cars at a few South Atlantic ports. Domestic production continues quoted at $39.50 per ton in bags f.o.b. Northeastern shipping point.

DRIED BLOOD: Sales are primarily confined to the feed market and unground, sacked blood is indicated at $6.75 to $7.00 per unit of Ammonia delivered in the Chicago area. The New York market is around $4.85 per unit of Ammonia.

POTASH: Movement continues to improve as the season advances and prices continue at previously announced levels. Supply position is comfortable.

GROUND COTTON BUR ASH: Demand is improving and supply currently adequate for this special form of Potash, primarily in the form of Carbonate of Potash. Prices compare favorably with Sulphate of Potash for most areas.

SUPERPHOSPHATE: This market is in good position with demand rising and supplies currently adequate. Prices are firm.

PHOSPHATE ROCK: No unusual activity in this market, with supplies and demand in good balance.

AMMONIUM NITRATE LIMESTONE: Prices continue unchanged, at previously announced levels and demand is picking up rapidly in the Southeast.

AMMONIUM NITRATE: Barring adverse weather conditions, demand for this product should increase heavily beginning this month. Prices continue at $70.00 to $72.00 per ton, bagged, f.o.b. production point.

GENERAL: The Southeast particularly has suffered recently from extremely bad weather conditions, which, on top of the effect of the Soil Bank Program, have held up the normal movement of mixed fertilizers and raw materials used in mixed fertilizers. Prices of raw materials remain steady, but volume throughout the Southeast is expected to be less by a good margin than last season. The severe freezes in Florida constitute a blow to agricultural operations in that state greater than anything in the last fifty years.

INDUSTRY CALENDAR

Date	Organization	Place	City
Mar. 3-4	Scu. Fert. Safety	Peabody Hotel	Memphis, Tenn.
June 9-11	Sou. Control Officials	Heart'Atlanta Motel	Atlanta, Ga.
June 12	Fert. Safety Exec. Comm.	Hotel Roanoke	Roanoke, Va.
June 15-18	Nat'l Plant Food Inst.	The Greenbrier	White Sulphur
July 8-10	Pac. N.W. Fert. Conf.		Pocatello, Idaho
July 16-19	S.W. Fert. Conf.	Buccaneer Hotel	Galveston, Texas
Aug. 20-24	Canada Fert. Assn.	Manoir Richelieu	Murray Bay, Que.
Oct. 22-24	Pacific N.W. Annual		Gearhart, Ore.
Nov. 9-11	Calif. Fert. Assn.	Ambassador Hotel	Los Angeles, Cal.

new producer in North Carolina—

Carolina Fertilizer Company Begins Operation At Fair Bluff

View of plant from south side during construction, showing machinery monitors and bagged goods warehouse; General Manager Al Hallman in foreground.

A new fertilizer mixing firm appeared on the North Carolina scene when Carolina Fertilizer Company began operations at Fair Bluff in January.

The 15,000-annual-ton plant will distribute its "Caro-Co" mixed goods primarily in Columbus and Robeson counties, N. C., and Horry and Sumter counties, S. C. Addition of a line of direct-application nitrogen solutions is contemplated this summer.

A. O. Hallman, former manager of Reliance Guano Co. at Whiteville, and a veteran of 34 years in the fertilizer industry, joined the new enterprise as general manager in October and helped with design and installation of the manufacturing facilities. Other officers are: Monroe Holliday, president; A. J. Cartrette, vice-president; B. H. Small, secretary; and Jules Holliday, director. Jack Dollar is foreman at the plant.

Site of the operation is just off U. S. Highway 76 alongside the Atlantic Coast Line tracks, two miles east of Fair Bluff.

Planned around its 7000-ton storage capacity and a daily mixer output of 300 tons, the plant is of conventional design and equipment for ammoniation of powdered goods. The building is designed around the storage piles of raw materials and mixed fertilizers, along with the machinery and working space required to mix and move these materials. (See floor plan on opposite page.) Allowance was made in the layout for future expansion and for possible changeover of manufacturing processes.

The building is designed of conventional timber post construction at all bents (transverse sections) where bulkheads are required, but features trusses to span over storage piles where large bins are located, keeping columns out of the storage piles. Bookshelf-type bulkheads were used to minimize wall pressure. The building was designed to use standard timber lengths to minimize waste in construction.

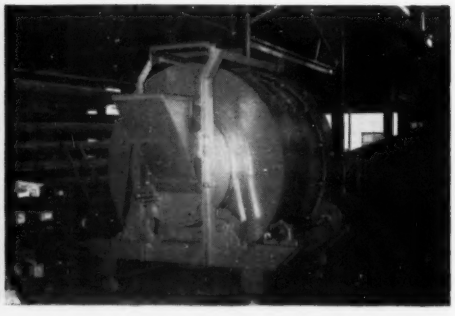
The conveyor system is designed to serve all bins from the materials unloading elevator or from the mixing unit.

Batching and mixing equipment includes a materials elevator, five-compartment materials assembly hopper and dial-type weigh-hopper scale, 1½ ton batch mixing unit, and base storage elevator. Provision has been made for delivery of materials to the assembly hopper unit directly from cars on the rail siding as well as from raw materials bins. A ramp affords access from the rail siding platform past the unloading elevator down to the materials floor work aisle in the center of the building.

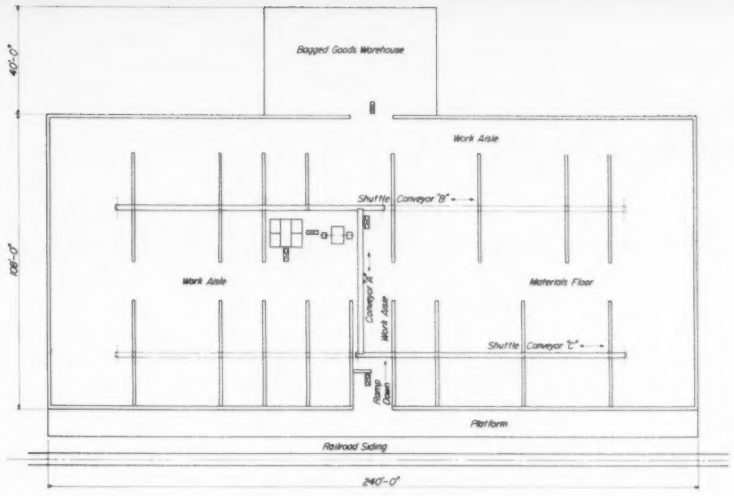
After mixing or basing, materials are delivered by the conveyor system to storage bins for curing. For certain grades, a "hot" bin is provided near the basing elevator, and material is stored for approximately 24 hours, and delivered by tractor shovel directly into the basing elevator to be rehandled over the conveyor system to another storage bin. This provision has been particularly advantageous on grades like 4-12-12 where there is a delayed reaction after mixing, causing a temperature rise in the pile during the first 24 hours. Results from rehandling and aereation give cooler pile temperatures and better condition in contrast to extremely hard goods, poor condition, and chemical reversion sometimes encountered without rehandling.

A separate shipping unit is provided, and work aisles in the center of the building and on the south side afford access to all bins. All of the south bins can be worked in shipping without any interference with mixing operations, and raw materials bins are located so as to cause a minimum of interference when shipments are made from the north storage bins.

The batch mixer and nitrogen solution equipment are located low, on the platform floor level, and are well supported. Equipment is compactly located and at the same time located with sufficient room for comfortable operation and maintenance. Chutes are of generous size and steep slope, with access doors for cleaning.



At left: Photograph taken inside building while erection was in progress, looking down aisle toward west, shows general timber construction of building, also elevator and materials assembly hopper location.
Below: Pre-installation photograph of Atlanta Utility batch mixer with submerged-type nitrogen solution distributor which is supported at both ends of mixer drum.



Scale diagram at right shows general plan of Carolina Fertilizer plant, indicating location of aisles, bins, conveyors, elevators, and major units.

An outstanding feature of the mixing equipment is the new 1½ ton Atlanta Utility Works batch mixer which has a submerged-type nitrogen solution distributor supported at both ends.

The bagged goods warehouse is a wing on the south side of the plant, located with plentiful space for loading trucks. The new office building is a separate structure, also located on the south side.

Design work for the new plant was done by Mr. Hallman, along with R. E. Robinson of Atlanta Utility Works, East Point, Georgia, who furnished the manufacturing equipment.

New Flowmeter, Catalog From Fischer & Porter

Fischer & Porter has announced a new magnetic flowmeter which accurately measures the flow rate of "difficult" liquids such as acids and slurries without adverse effects to the meter. Major features are: manual adjustment for setting any desired flow rate at full scale (The 1" meter can be set to handle from 3 to 40 gpm at full scale; the ½" meter as low as one gpm.); unrestricted flow; readings unaffected by velocity profile, density, or viscosity; voltage changes between 90 and 125 volts and frequency changes between 55 and 65 cycles have no effect on readings; special piping for long metering runs is not required; flow can be measured in either direction.

Fischer & Porter's new catalog 10D1416 discusses principle and operation of magnetic flowmeters. For free copy, write to Fischer & Porter Company, 461 Jacksonville Road, Hatboro, Pa.

Art Linkletter Child Knows Answer

In his new book "Kids Say the Darndest Things," Art Linkletter says he asked on his TV show "What does this expression mean: 'The grass is always greener in the other fellow's yard' ". The child's reply: "He's using better fertilizer than you are."

TRIPLE THREAT CHEMICAL!

SPRAYS • DUSTS • FERTILIZER

TRIANGLE BRAND **COPPER SULFATE**

Successful growers prefer fertilizer and fungicide formulations containing Triangle Brand Copper Sulfate. They know that in fertilizers it is necessary for enrichment of the soil; in fungicidal sprays, where Bordeaux Mixture is the most reliable, or in copper dusts, Triangle Brand Copper Sulfate has definitely proved its superiority over organic materials.

Use of Triangle Brand Copper Sulfate in sprays, dusts and fertilizers results in larger and healthier crops, meaning MORE PROFIT for the grower and MORE PROFIT for the mixer or formulator who serves him.

Triangle Brand Copper Sulfate, which will increase your profits, comes in these convenient forms:

INSTANT (powder) for quick and efficient mixing of Bordeaux sprays.
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NATIONAL JOINT COMMITTEE
SOON TO BE READY—

Revising Fertilizer Application Data

by WALTER C. HULBURT, *Head*
Planting and Fertilizing Equipment and Practices Section
Agricultural Engineering Research Division, ARS, USDA

This past year, the National Joint Committee on Fertilizer Application has worked on the revision of their bulletin "Methods of Applying Fertilizer" which was originally issued in 1948. In the past nine years, considerable change has been made in the technique of application and equipment for field use.

The NJCFA is made up of representatives of three professional groups (Agronomists, Engineers and Horticulturists) and three association groups (National Plant Food Institute, Farm Equipment Institute and National Canners Association). The working part of the Joint Committee is carried on by the subcommittees, working on problems identified by crops or equipment. In the revision of the original Bulletin, a committee was set up with the chairman of each crop subcommittee and equipment sub-committee to resurvey the recommended methods of applying fertilizer. This work is almost complete at the present time and is hoped to be in printed form early this coming year. It is on the work of the subcommittee on Cotton that this presentation is primarily based.

Additions are made in this discussion of various photographs taken from our files and from the NJCFA library of color slides, as well as of other material of the Project with which I have been associated the past fifteen years.

In this respect, it might be of interest to give a short sketch of the early activity of the Project, as its start was instigated by the problem of cotton injury from the so-called "high analysis" fertilizers placed on the market after World War I. This Project, started some thirty years ago, was known as the Fertilizer Distributing Machinery Investigations and used this name until this past summer when its scope was broadened to cover both planting and fertilizing equipment and practices under the new Branch of the Agricultural Engineering Research Division known as the Crop Production Engineering Branch.

From presentation at the Third Annual Beltwide Cotton Production Conference, Memphis, Tennessee, December 1957

The early activity of the Project was under the direction of the late Glenn A. Cumings whom I am sure a great many of you knew or were acquainted with some of his publications of the 1927-1954 period. The study on cotton started in the late 20's was one of the first carefully planned programs on which both agronomists and engineers were working together with replicated field experiments and with special field machines which were designed specifically to meet a wide variety of planting and fertilizing methods. I might add that the decision to work on the problem created the Project that has branched out from the one crop study to more than forty kinds of crops in the past three decades and that has done cooperative work in more than two-thirds of the States of the country. The objective of the original problem was to determine ways in which cotton could be planted and fertilizer applied without injury from the new relatively higher analysis fertilizers placed on the market after World War I. Mr. Cumings designed the first machine made expressly for the cotton planting and fertilizer placement program and it was built on contract by the Cole Manufacturing Company. Two additional machines were made of this type and a great many experiments were put in in the ensuing years up to World War II in most of the southern states—from the Carolinas to Texas.

The success of these first special cotton machines gave the green light to establishing a laboratory where these special machines could be designed and constructed by research agricultural engineers. At the present time, machine No. 71 is being constructed in our laboratory.

Possibly the great benefit of this series of experiments was the general conclusion that the proper use of fertilizer in a continuous band to the side and below the seed protected young seedlings against damage from toxic salts or popularly so-called fertilizer burn. A secondary result, but probably of equal importance, was the fact that under many conditions better utilization was made of fertilizer in the band application in comparison with broadcast methods. Subsequent studies on many crops have shown the yields to be greatly increased by band placement and the danger of seedling damage from concentrated fertilizer salts of little or of no importance in the study. Consequently this engineering research unit fully appreciates being called upon for help on cotton planting and fertilizing problems of that period some years ago.

The following is a summary of the recommendations submitted by the Cotton sub-committee of the National Joint Committee for the revision of the Bulletin:

Methods of Applying Fertilizer to Cotton

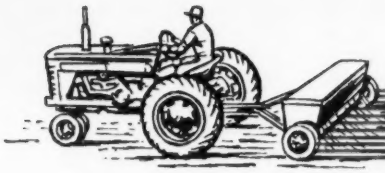
A primary problem in applying fertilizers to cotton is placement with respect to the seed row to obtain early growth stimulation without impaired germination of seedling injury and still provide an adequate supply of plant nutrients.

Methods of applying fertilizer to cotton may be grouped broadly into two categories: (1) drilled or band placement and (2) broadcast application. When drilled or banded, the fertilizer can be placed either on the surface or in the soil. In broadcasting, it may be placed on the surface, plowed down or mixed with the soil.

HUMID AREA

Placement of Solid and Non-Pressure Liquid Fertilizers

In determining the placement of



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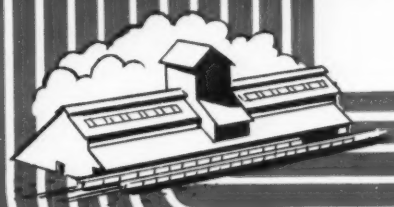

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fertilizers, several factors should be considered: **(1)** ratios of nitrogen (N), phosphate (P_2O_5), and potash (K_2O), **(2)** time and rate of application, **(3)** type and texture of the soil, and **(4)** weather conditions expected following application. In general, it has been found that placement of complete fertilizer in narrow bands a short distance to one or both sides of the seed row and below the level of the seed reduces the possibility of salt injury without reducing utilization efficiency. The higher the rate of application, the further to the side of the seed row and the deeper the fertilizer should be placed. The fertilizer must be near enough to the plants for utilization in early growth. Some solutions may contain free nitrogen and should be applied similarly to anhydrous ammonia.

Liquid fertilizer solutions containing one or more available plant nutrients may be applied at, or prior to planting, and as a side-dressing using the same methods and techniques for solid materials.

The following methods of placement can be expected to give satisfactory results with the rates indicated. The rate indicated may not be the maximum rate, but that at which no noticeable salt injury would be expected under most circumstances.

Side Placement

The side placement or banding of complete fertilizers can be accomplished simultaneously at planting. This operation is sometimes performed during seedbed preparation. The fertilizer is placed in narrow bands approximately 2½ inches from the seed row and 2 to 2½ inches below the level of the seed. The combined application rate of nitrogen and potash generally should not exceed 84 pounds per acre on loamy sand soils; 100 lbs. per acre on sandy loams, silt loams and loamy soils; and 140 pounds per acre on clay loams and clay soils. Placement in bands 3 to 3½ inches to one or both sides of the seed row and 3 to 4 inches below the level of the seed should allow for an increase of 25 to 30 per cent in rate of application with no appreciably salt injury. Placement at only one side of the seed row results in a minimum disturbance of the seedbed.

The side placement of the plant nutrients, as recommended, is a precise operation and certain precautions in equipment adjustment and careful operation are required. Should a poor stand be obtained due to salt injury or other factors, it may be difficult to avoid a recurrence of this damage without extensive repreparation of the seedbed. This causes added expense, delayed planting, plus decreased fertilizer efficiency, particularly for phosphate and potash.

Placement in Water Furrow

The fertilizer is placed in a narrow band in the water furrow and the land rebedded. The water furrow should be of such depth that the fertilizer will be 3 to 4 inches below the level of the seed. The combined rate of nitrogen and potash application should not exceed 84 pounds per acre on sandy loams, loams and silt loam soils; or 140 pounds per acre on clay loam and clay soils. Since cotton germinates quicker and a better stand is usually obtained when planted in a firm seedbed, it is advantageous to apply the fertilizer and prepare the seedbed and then plant after the seedbed has settled.

Mixed with the Soil in the Row

The fertilizer is mixed with the soil in the row and a ridge or raised bed is formed over the fertilizer so that it will be approximately 2 inches below the level of the seed. The combined rate of nitrogen and potash should not exceed 72 pounds per acre on sandy loams, loams and silt loam soils or 120 pounds per acre on clay loams and clay soils. Here the seedbed should also be prepared and fertilizer applied a week or ten days before planting.

Broadcast

On soils of high fertility or where large applications of fertilizer are used, good results have been obtained by broadcast applications. The fertilizer may be plowed down or mixed with the soil prior to preparation of the seedbed.

Side-dressing

It is recommended that a part of the total nitrogen be applied as a side-dressing, because there is likely to be less loss of nitrogen by leaching, particularly on sandy soils. The side-dressed nitrogen is usually applied after the first cultivation and not much later than the early-square stage of growth.

The most essential feature for consistent effectiveness is to place the nitrogen far enough to the side of the row to avoid mechanical injury to the roots and sufficiently deep that it will not be disturbed by later cultivation. There are indications that even deeper placement of nitrogen as a side-dressing might be beneficial in dry years.

On deep, sandy soils are also very low in available potassium, it may be advantageous to apply part of the potassium as a side-dressing to minimize its loss by leaching. If potassium is applied as a side-dressing, it should be placed at the edge of the root zone and 2 to 3 inches below the usual depth of cultivation just prior to early square formation. Where loss by leaching is not a problem adequate amounts of potash usually can be applied safely at or prior to planting by reducing the amount of nitrogen applied in the complete fertilizer to about one-fourth to one-third of the potassium.

Pressure Liquids (Free NH_3)

When rates of anhydrous ammonia up to 60 pounds of nitrogen per acre are sealed 6 to 8 inches below the seed row, there is little danger of impaired germination or seedling injury. When the opening made by the knife opener is loosely filled with soil, the ammonia is permitted to rise, increasing the possibility of injury. When moisture is limited and high rates of application are used, there may be injury to the seed or seedlings by movement of the nitrate nitrogen upward even though placed 6 to 8 inches deep. Damage of this nature may be avoided by applying the ammonia 4 to 6 inches to the side and 6 inches below the level of the seed drill. Where land is to be planted flat and the ammonia applied without regard the subsequent placement of seed, injury may be minimized by spacing the applicators 18 to 20 inches apart and planting crosswise to the direction of application of the ammonia. This reduces by about one-half the amount applied to any one opening. Early growth of the cotton may be irregular with this method of application.

The difficulty of applying ammonia increases as soils become less friable, more compact, more trashy and as the rate of application per foot of row increases. Successful application of recommended rates of ammonia is accomplished when the soil is in the best physical condition and adapted equipment is used.

Aqua and anhydrous ammonia behave alike when applied to the soil, therefore, similar equipment and methods may be used during application. When properly applied, there is no difference in the re-

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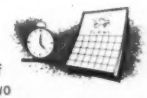

Hi-D supplies a total of 33.5% nitrogen in two equal "servings." 16.75% is *nitrate* nitrogen to get crops off to a fast vigorous start. 16.75% is *ammonia* nitrogen for follow-up feeding during the growing season.

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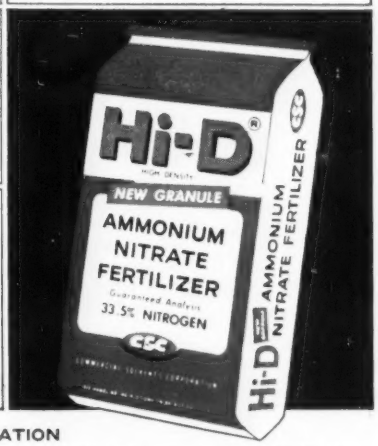

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sponse of cotton to aqua ammonia and anhydrous ammonia.

Side-dressing

If a quick response is desired, anhydrous ammonia should be placed in the edge of the root zone. If no nitrogen was applied before planting, the ammonia should be applied immediately after the cotton is chopped and should be placed 6 to 8 inches to the side of the row and 6 inches deep. If the ammonia is to be applied as a supplement to a preplant application or to an earlier side-dressing, it may be applied further from the young plants.

In side-dressing cotton, escaping ammonia may burn the leaves of young plants. This damage is normally outgrown in a short time, but the escaped ammonia is lost.

SUB-HUMID AREA

Placement of Solid and Non-Pressure Liquid Fertilizers

In the West, fertilizers are generally applied in bands to the side and below the seed at planting time or to the side of the young plants during the first cultivation and before the first irrigation. Occassionally preplant fertilizers are banded in the bed, with precautions taken to prevent planting directly over the fertilizer band. Broadcast applications are sometimes used prior to planting or after emergency and the fertilizer is worked into the soil during cultivation.

Broadcast applications of dry fertilizer, full coverage injection of solutions or fertilizer applied in irrigation water are usually less effective than banded or side-dressed fertilizer.

Fertilizers applied to cotton at planting time should be placed at least 3 inches to one or both sides of the seed row and approximately 2 inches below the seed level on soils of medium to heavy texture. On soils of light texture, it is necessary that the band be further removed from the seed row to prevent salt injury. An alternative practice is to apply the fertilizer as a side-dressing when a satisfactory stand has been assured and before the first irrigation. The fertilizer should be applied at the outer extremes of the lateral root extension 4 to 6 inches) to the side of the plants) to avoid mechanical injury to the roots, and at a depth so that it will not be disturbed later during cultivation. Where furrow irrigation is used, the fertilizer should be placed below the level of the water.

For preplant applications the fertilizer band should be deeper in the soil than for banded application on the side of the seed row. The seed should not be planted directly over the fertilizer band.

On severely deficient soils, the nitrogen application may be delayed until the plants are well established and losses from seedling diseases minimized. Phosphate materials, however, should be applied as early as practicable, but it is often preferred to withhold applications of nitrogen and phosphorus until a satisfactory stand is obtained.

Fertilizer placement on light textured soils is critical. The fertilizer band placed 7 inches from the row in sandy soils is more effective than wider spacings. On heavier textured soils, placement is not critical and significant differences have not been obtained between 7 inch and 20 inch placement.

General fertilizer recommendations are usually impractical in the sub-humid area because of the diversity of soils and cropping conditions encountered.

Nitrogen use varies from 0 to 200 pounds actual nitrogen per acre and normally 40-60 pounds actual phosphate are sufficient. However, use of phosphate varies from 0 to 80 pounds. Potash is usually in adequate natural supply and should not be used alone. In some cases, it has actually caused yield reduction when used in cotton with adequate amounts of nitrogen and phosphorus.

Side-dressing

Side-dressed fertilizer should be applied far enough to the side of the row to prevent mechanical injury to the roots. Distance from the row must vary with the kind and amount of fertilizer, soil conditions and plant size. With furrow irrigations, the fertilizer should be placed below the level of irrigation water. No significant differences have been found in side-dressing with nitrogen on one or both sides of the row, but phosphorus is more readily used from applications on both sides of the row.

Application of nitrogen and sometimes nitrogen and phosphorus are made in irrigation water when it is impractical to apply fertilizer by other methods. Fertilizers applied in water or by broadcast applications are usually only partially as effective as materials applied by side-dressing.

Split applications of nitrogen are often used where leaching is a problem. Ammonical nitrogen sources are most frequently used under these conditions with half the nitrogen applied soon after planting and the balance in advance of early flowering. On soils of loam or clay texture, applications of fertilizer need not be split.

Pressure Liquids (Free NH_3)

In the West, experience has shown that it may be hazardous to plant cotton directly over 6-8 inches deep preplant application of anhydrous ammonia. Applications which allow diffusion of ammonia into the seed row or root zone of small plants should be avoided. Similar equipment and techniques used in applying anhydrous and aqua ammonia to cotton in the humid area are applicable in the sub-humid section.

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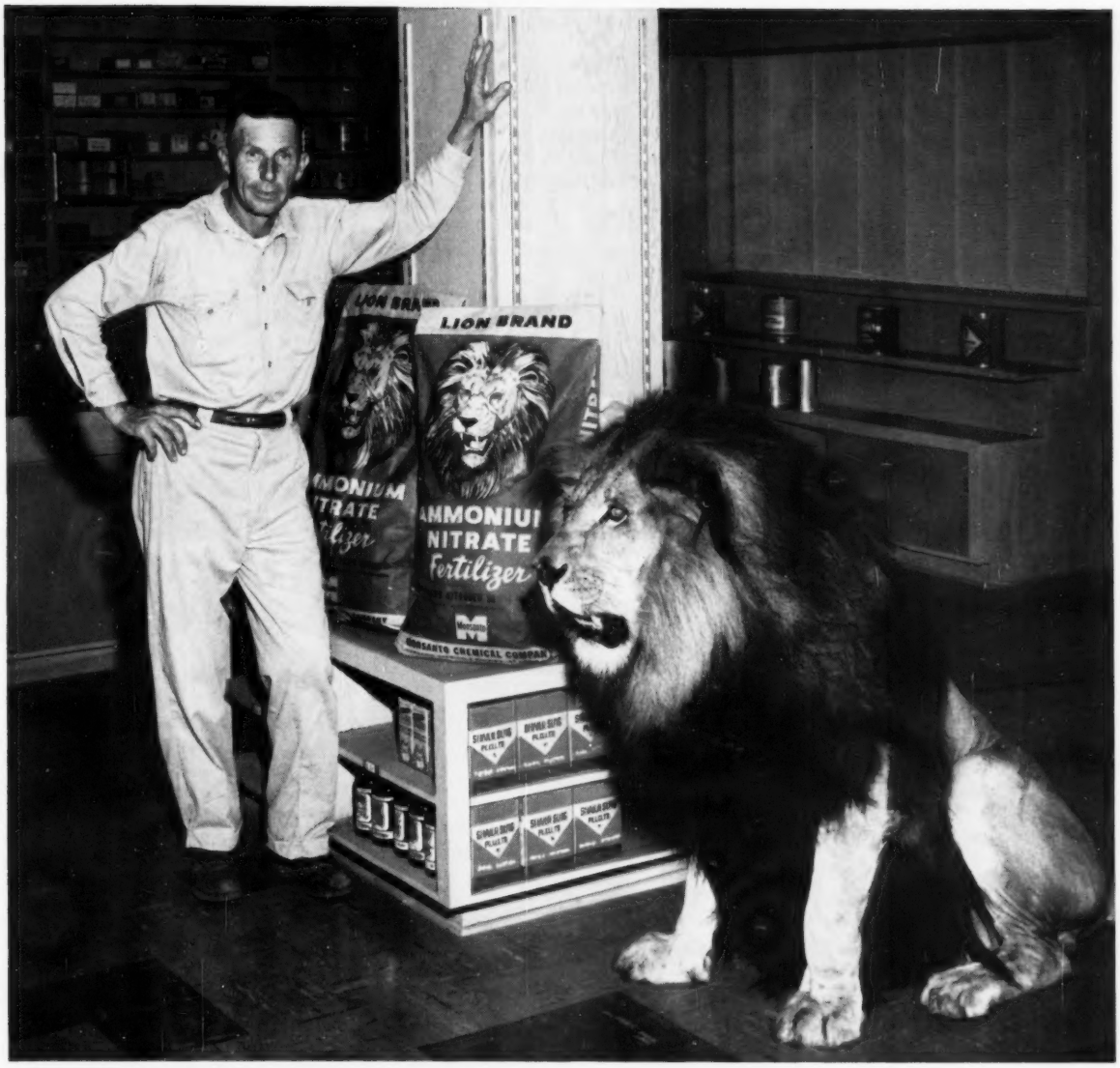

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Mississippi ASA Elects Bailey

The Mississippi Section of the American Society of Agronomy, approved a proposal of its retiring president, State Commissioner of Agriculture Si Corley, to appoint a Plant Food Committee to promote the acceptance of Experiment Station fertilizer recommendations on more farms.

Dr. Ivan Miles of Starkville was named to head this committee. Also appointed were M. R. Calder of Magee, J. T. Caldwell of Jackson, R. R. Corvell of Jackson, L. E. Gholston of State College, Earl Bailey of Starkville, and Dr. C. Dale Hoover of State College.

Earl H. Bailey of Starkville was elected president for the coming year. Mr. Bailey is Mississippi and West Tennessee field agronomist for the American Potash Institute.

M. G. Field of Hattiesburg, representing the Meridian Fertilizer Factory, and L. E. Gholston, Extension Service associate agronomist, State College, were elected vice presidents.

Owen Cooper of Yazoo City, executive vice president of the Mississippi Chemical Corporation, said that the success of this company is proof of the value of Mississippians investing in the future of Mississippi agriculture.

J. H. Watson of Dumas, junior at Mississippi State College, was awarded a plaque and scholarship for next year by National Plant Food Institute.

Alex McKeigney predicted still further dividends to Mississippi agriculture will result from continuing co-operation between farmers and the Experiment Station, the Extension service, and Mississippi State College.

Belgian Process Claims Free-Flowing Ammonium Sulfate

Complete information describing the use of "Tensiorex P," a new Belgian polyethylene glycol for the prevention of caking of ammonium sulphate is presented in a 20-page bulletin published by Tensia, Societe des Produits Tensio-Actifs et Derives, Tensia S.A., Rue Rouveroy, Liege, Belgium.

This bulletin includes a "Study on the prevention of caking of ammonium sulphate," and states that an addition of 100 grams of "Tensiorex P" per ton of sulphate affords: **(1)** A reduction of 20% in the cost of labor, motive power and maintenance of handling equipment, and **(2)** A corresponding increase in the speed of delivery without increase in labor or plant.

Hayes and Stolz Industrial Manufacturing Company of Fort Worth, Texas, has moved into this new brick office structure recently completed at their plant site. These new facilities now include over 3300 square feet of completely air-conditioned office space, which provides executive offices, engineering department, drafting offices, bookkeeping and billing departments, and a completely fireproof vault for the storage of designs and prints.

The literature also claims: This process of prevention of caking of ammonium sulphate is very easily applied without any modification of existing plant equipment; the liquid reagent is easily sprayed and is non-volatile and non-corrosive; it adheres evenly to the salt and therefore there is no fear of loss which could happen with solid materials that are rapidly lost in the form of dust when the sulphate is stored.

The study also states that this Belgian chemical does not modify at all the appearance or the usual qualities of the ammonium sulphate which is protected from caking, not only during storage and delivery, but also during transport and application.

Copies of the "Tensiorex P" bulletin and/or additional information can be obtained by writing to the Belgian Industrial Information Service, 630 Fifth Avenue, New York 20, N. Y.

St. Regis Repeats Sliderule Offer

The popularity of its paper selector for multiwall paper bags designed in convenient slide rule form for easy reference, has prompted St. Regis Paper Company to make an additional quantity of these selectors available. With the selector, it is possible to determine the type of paper best suited to meet individual multiwall bag packaging requirements.

Information is provided on such topics as the type of protection offered by multiwall bag papers, the properties of multiwall bag papers, a description of the various types of papers and a representative list of the products using particular plies. By utilizing the slide rule

format, it is possible to select any multiwall bag paper and quickly find its properties, a description of its construction, and its present product packaging applications.

The selector indicates which papers will provide protection against grease and oil, acid and alkali, scuff and abrasion, bacteria and insects, moisture vapor and water damage.

Dorr-Oliver Offers Hypalon Pump Linings

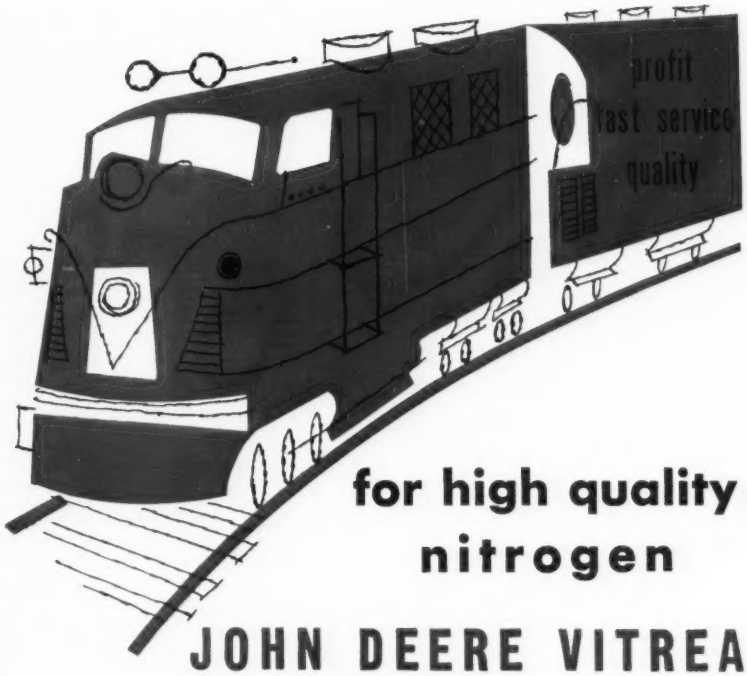
Dorr-Oliver Incorporated has announced immediate availability of Hypalon-lined Olivite and Oliver Diaphragm Slurry Pumps. All presently available sizes of these two familiar chemical pumps are now lined with Hypalon synthetic rubber to provide greater resistance than heretofore to both abrasion and corrosion. This new type of lining, now standard for the two D-O pumps, replaces the familiar hard and soft Olivite, neoprene and other elastomers which will continue to be available.

Before being incorporated into the design of the two pumps, Hypalon was tested by Dorr-Oliver for well over a year. In exhaustive field tests this material has far excelled other natural and synthetic materials in its ability to withstand a far wider range of temperatures and chemicals, particularly oxidizing solutions. Hypalon (chlorosulphonated polyethylene) is a relatively new synthetic rubber introduced by Du Pont some five years ago.

The Olivite and ODS Pumps are two of the three major Dorr-Oliver chemical and industrial pumps. The former, developed over 30 years ago and available in 1¼", 2" and 4" sizes, is a lined centrifugal pump particularly applicable for handling corrosive liquids. A pneumatically operated diaphragm pump requiring no mechanical linkage, the ODS is available in 1½", 2", 3" and 4" sizes. In both pumps all parts in contact with solution are Hypalon lined or covered. All sizes except the 4" Olivite, which is presently under development, are in current production.

To date the chemical and abrasion resistance of Hypalon has been tested on a wide variety of highly corrosive and abrasive materials. The results, available in a table specifically prepared by Dorr-Oliver, indicate the applicability of this new elastomer to virtually every pumping service in the chemical processing industry.

on the right track



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Culpepper *speaks out on* TVA *Study*

– *Praises Committee's Recommendations*

– *Takes Issue With TVA's 'Reservations'*

Statement by JOE E. CULPEPPER
General Vice President—Marketing
Spencer Chemical Company

The Elevation Committee appointed by the Tennessee Valley Authority to make a survey of the TVA Distributor Demonstration Program with TVA fertilizers did a thorough and excellent job. It examined the full scope of the TVA program and its report and recommendations* made interesting reading.

However, TVA's attitude toward some of these recommendations is disappointing. Considering the caliber and broad background of experience of the men who make up the Committee, it is difficult to understand how TVA was able to find a sound basis for taking exception to some of the Committee's most pertinent recommendations.

The Committee made a total of thirty-two specific recommendations for improving and strengthening the program. Twenty-six of the recommendations TVA accepted without question but had definite "reservations" on the remaining six.

Generally speaking, I feel these six points relate to the most pertinent aspects of the Committee's work. It is interesting to observe that the six recommendations to which TVA took exception deal with the phases of the TVA program most strongly questioned by the fertilizer industry.

For example—and this is of utmost importance to private industry —the Committee recommends that qualified farm uses for TVA materials should be clearly of an educational nature and should be defined more rigorously and exactly; moreover, educational activities should be evaluated and supported on the basis of their merits in education, without regard to plant production capacity.

The Committee stated in their findings that the amount of fertilizers distributed has exceeded that which can be justified solely on the basis of education. Factors other than the quantities required for reaching the stated educational objectives have played a determining role in establishing the tonnage of materials distributed, according to the report.

Yet TVA stated in releasing the report that "it does not believe that closer adjustments are possible under the circumstances," and that maintenance of production at an exact level to meet educational requirements fully, but no more, is a difficult task.

Such a task appears to me not to be so difficult as TVA would indicate. Every private manufacturer of fertilizer faces such a task annually. He must estimate his markets and set his production schedule accordingly. There is no reason why TVA should not be equally accurate in anticipating its seasonal needs.

TVA would appear to want to sidestep the issue dealing with the area of distribution. The Committee recommended, aside from responsibilities in the Tennessee River Watershed, the geographic spread of materials should be extended and the concentration at particular locations should be decreased. TVA, in their comments accompanying the report, does not indicate it contemplates any such decrease of concentration. It states "quantity should be the amount necessary to carry on an efective educational program geared to the requirements of particular areas." Last year 75 per cent of TVA's 141,000-ton ammonium nitrate production was used in a 7-state area.

Another recommendation of the Committee, one of the six in which TVA did not concur, was that limits be established for the length of time a new product should be included in the Distributor Demonstration Program, as well as a time limit set on the number of years "an individual farmer can obtain fertilizer for a particular special use." TVA begs this question, halfway apologetically, by stating they agree in principle but not in practice . . .

The Committee recommended that TVA should not use fertilizers in the Distributor Demonstration Program which are inferior in quality to those commercially available to the farmer. This recommendation, according to TVA, is directed at the handling qualities of TVA's ammonium nitrate and that this handling quality is due to the process of manufacture. TVA uses the vacuum crystallization process for producing this product. The reason for this, says TVA, is that this process is cheaper and safer than the prilling process generally adopted by the fertilizer industry. Private companies, always alert to costs and safety, nevertheless felt the expenditure of millions of dollars, in development costs alone, was justified for product and process improvement. Industry made this investment for producing a better product in order to meet the convenience and demands of farmers.

TVA also discounts the Committee's recommendation that TVA stop distributing materials in mixed fertilizers where these materials are readily available commercially. TVA, however, says it feels this recommendation does not give sufficient weight to the fact that improved mixing technology and the more efficient use of raw materials in the manufacture of high analysis mixtures offer very inviting possibilities for reducing the cost of plant nutrients to the farmers . . . Actually, there is no reason why such experiments cannot be conducted on a laboratory scale and the results made available to all agricultural interests.

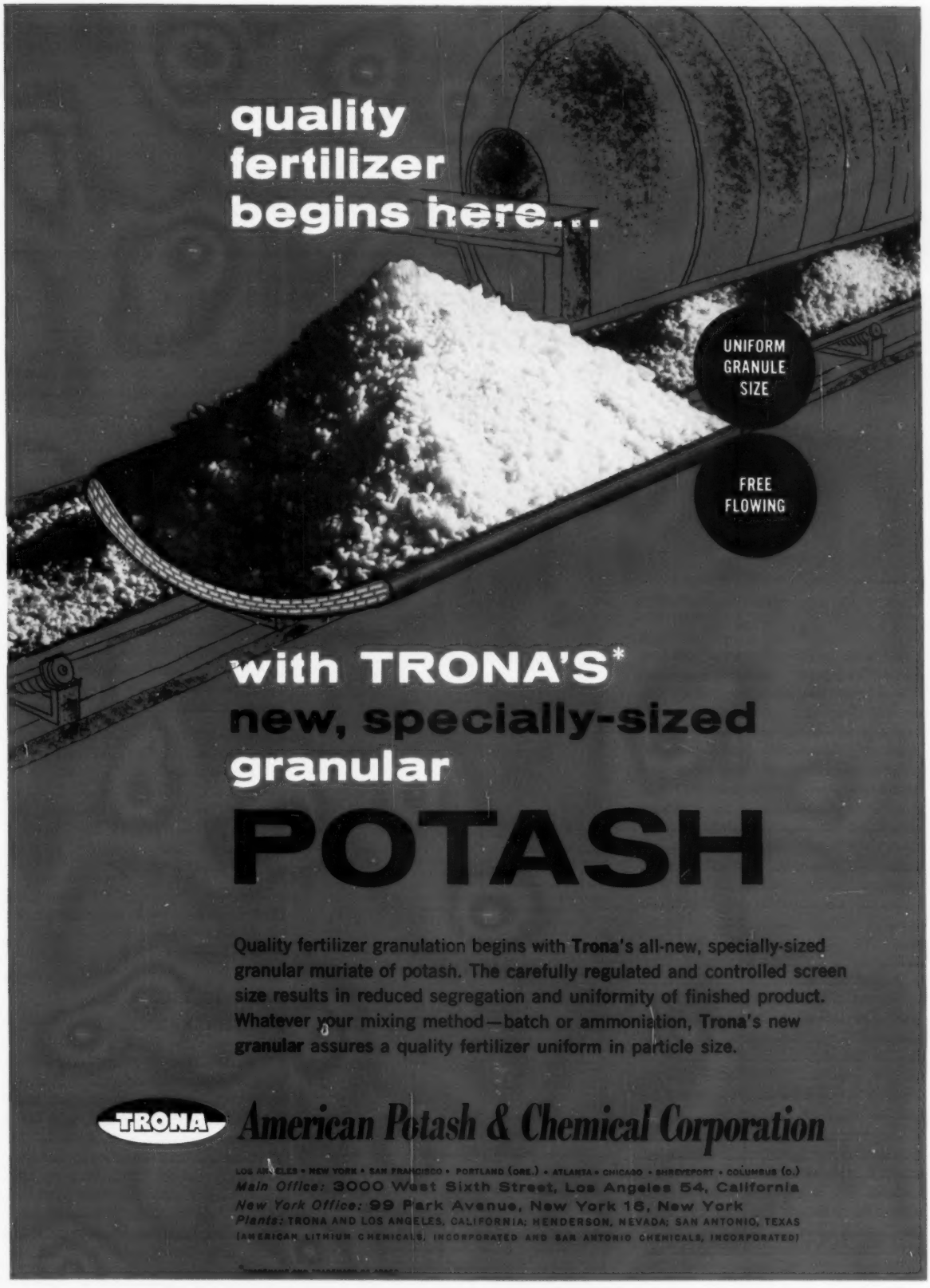
It is my judgment that if TVA accepts and applies in practice the recommendations made by the 11-man Committee relative to these six vital points, many of the objections of the fertilizer industry to TVA's fertilizer program will be eliminated. The Committee members, all outstanding men professionally, are to be congratulated for their thorough and objective approach.

* *Reported fully in* COMMERCIAL FERTILIZER'S *February issue.*

Cotton Belt Irrigation Slides Available

A set of 24 colored slides on supplemental irrigation in the humid section of the Cotton Belt is being distributed by the National Cotton Council.

Designed to be used primarily for class instruction by vocational agriculture instructors and county agents, the set is available at cost ($6.00) from the National Cotton Council, P. O. Box 9905, Memphis 12, Tenn.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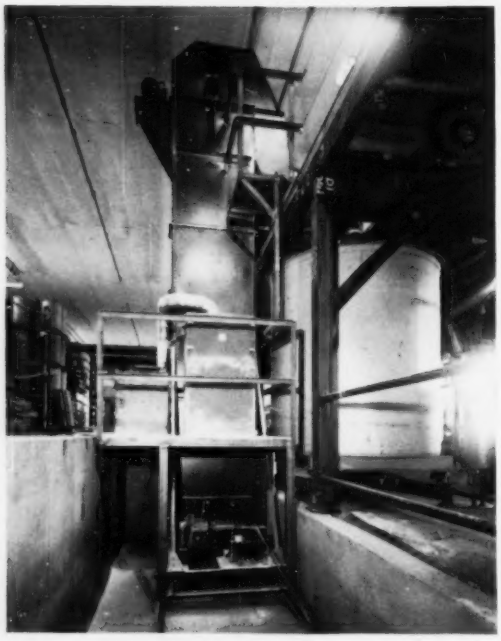

View of pit shows drive mechanism for propelling traveling bucket elevator along rails parallel to line of reactors.

A bucket elevator that can be moved along rails to service a number of reactors provides a solution in handling bulk dichlorophenoxyacetic acid at the new plant of the American Chemical Paint Co., St. Joseph, Mo., where weedicides and plant hormones are formulated.

ACP has installed reactors which are fed bulk chemicals. To service a row of these reactors, a track-mounted Link-Belt Type 204 centrifugal discharge bucket elevator, equipped with wheels, travels 50 ft. parallel to the line of reactor openings. This unusual "mobile" application of a bucket elevator has facilitated the handling of nine tons of the acid an hour and simplified the problem of "charging" the reactors. The powdered acid, weighing 50 lbs. per cubic ft., is handled in 8 x 5-in. malleable iron buckets affixed to C-102 chain at 16-in. intervals.

To prevent escape of material, the elevator is equipped with dust-tight casing construction and dust seals around the head and boot shafts. Accurate amounts of the chemical are loaded into the elevator in accordance with the particular formula being produced.

Buckets are discharged by centrifugal action directly into the reactors as they pass over the head sprockets. Takeups consist of adjustable head shafts.

Link-Belt furnished the structural steel self-propelled carriage for this installation, complete with 1-h.p. drive and motor-mounted brake; the necessary elevator bracing and the cable reel with 50 ft. of travel.

The self-propelled carriage is controlled by push-buttons located at the top of the elevator. A service platform allows the operator access to the controls so that the elevator discharge spouts can be positioned over the proper opening.

The track-mounted bucket elevator was developed by Link-Belt at the suggestion of American Chemical Paint engineers especially to meet the plant's batch mixing requirements.

OWENS-ILLINOIS ANNOUNCES NEW KIND OF VALVE BAG

The thickness of the filled bags will change, but the length and width of the loaded pallet will remain constant with use of the new valve reducing insert bag developed by the Multiwall Bag Division of the Owens-Illinois Glass Co.

A new type of multiwall bag designed to facilitate palletizing, handling and warehousing of bagged goods in storage and shipment has been developed by Owens-Illinois' Multiwall Bag Division in cooperation with Wyandotte Chemicals Corp.

Main feature of the new bag is a pasted valve reducing insert that permits standardization of pallet patterns regardless of the density of the material being packaged. The The bag is also claimed to lend itself more readily to high stacking, thus making more economical use of space in boxcars, trucks and warehouses.

Owens-Illinois says the valve reducing insert now makes it possible to make a bag of standard length and width—but with a thickness when filled that may range anywhere from 3½ inches up to 6½ inches. The capacity of the bag, in other words, is varied to suit the properties of whatever is put in it, without altering the two dimensions that govern pallet patterns.

Wyandotte, which has been using the new bag since August, is discarding its old 2-1 pallet pattern for a new 3-2 pattern that will become standard throughout the plant. The new bag is 22½ inches wide, 25 inches long, and up to 6½ inches through when filled, against the old dimensions of 20 by 32 by 3¼ inches.

Owens-Illinois points out that a customer may specify whatever size valve reducing insert he may need to fit his packing machinery filling spouts. The insert is designed and applied to the bag so that a tight, self-sealing factor is added, insuring against costly spillage.

The new bag is three-ply, using two 40 basis weight sheets and one 50 basis weight sheet of natural Kraft paper.

NEW SOIL PH BOOKLET AVAILABLE

"What Every Plant Grower Should Know About Soil pH" is a comprehensive little booklet complete with charts, graphs, and illustrations—designed to help both the professional and amateur grower in achieving better lawns, bigger crop yields and more for his fertilizer dollar. This popular 16-pager, written by the well-known agricultural consultant, Dr. Robert E. Atkinson, may be obtained free of charge by writing: Beckman/Scientific Instruments Division, Fullerton, Calif., asking for Bulletin 731.

New Sohio Booklet Covers Solutions in Mixed Fertilizer

A technical booklet on nitrogen solutions for fertilizer manufacture has been published for the fertilizer industry by the Sohio Chemical Company.

Written by Sohio's Technical Service Department for day-to-day use in plant operations, the booklet contains a 16-page section discussing manufacturing with nitrogen solutions, plus basic information on various nitrogen solutions.

A section discussing fertilizer manufacture provides information in selecting solutions, along with a review of such topics as: Uniformity of ammoniation and absorption, reversion, temperature, alkalinity and acidity, hygroscopicity and solubility, and the use of urea and other specific materials.

Other sections discuss granulation versus conventional mixing, considerations and calculations in formulation, and plant and personnel safety.

The last section of the plastic-bound booklet includes product information sheets on various nitrogen solutions used in fertilizer manufacture, as well as aqua and anhydrous ammonia. Individual product information sheets as released by Sohio may be added to the booklet to keep product information up to date.

Requests for booklets should be addressed to the Agricultural Service Director, Sohio Chemical Co., P. O. Box 628, Ft. Amanda Road, Lima, Ohio.

5-10-10 Leading Grade In North Carolina

North Carolina farmers purchased some thirty grades of fertilizer during the last fiscal year. 5-10-10 led in sales with 285,378 tons. Next in order was 3-9-9 and 2-12-12 with respective tonnages of 250,550 and 139,157.

Sales of 5-10-10 represent 40 per cent of the state's total of 1,141,442 tons of mixed goods. It led in sales chiefly because 1-2-2 ratio is often recommended for corn, cotton, small grain, sorghum, and various vegetable crops.

The follow-up grade—3-9-9—will hereafter be limited for tobacco since farmers can get the same ratio with 4-12-12 goods.

Alfalfa, pastures, and corn under certain conditions account for most of the 2-12-12 sales.

The weighted average nutrient percentage of all fertilizers sold in North Carolina last year was 23.7, a marked increase over the figure of 22.2% for the previous fiscal year.

The Birds and - - - The Bugs

The war between bird lovers and fire-ant haters goes on. As we have been reporting from the front ever since hostilities broke out, the USDA is trying valiantly to stamp out the wicked fire-ant, while the Audubon Society and others are striving to hold back "massive" applications until the effect on wild birds can be appraised. The war continues.

Most recent bulletin from the front is from USDA, stating that careful consideration is being given to protection of wildlife in the fire-ant program. This is in answer to hot letters to Secretary Benson. It says that the program is not on a "massive" basis, but direct where infestations exist, to control spread of the fire-ant in 9 infected states. And control of the program is in the hands of the states . . . USDA funds supplementing state money.

USDA points out that Congress last year adopted a bill requiring USDA to help the states, and that complaints have come not only from farmers, but from urban areas as well. The fire-ant produces a nasty, fiery pain in humans, and raises angry welts on humans and animals. He builds large mounds which break plows, and ruin lawns. The ant is supposed to have come from South America via fruit ship some 20 years ago, and infestation began to be a serious problem at Mobile, Ala. at that time.

NEW TELESCOPING BOX CAR AND TRUCK LOADING CONVEYOR

Where limited dock space is available, this 17-foot power-driven conveyor will extend to 51 feet. Designed to automatically compensate for variations of dock levels to truck beds and box car floors.

Will deliver bags and packages right to stacking point, retracts under power with push button controls. The complete conveyor is mounted on swivel casters and can be moved easily to any location. Headstand equipped with scissors jack gives 14-inch height adjustment, has adjustable discharge plate.

The conveying element is a series of spring belts and grooved rollers with only 10 inches overall height required for each deck. Each level is individually powered.

Can be modified to suit conditions; made by Power-Curve Conveyor Co., 2185 S. Jason Street, Denver 23, Colorado.

ARSENIC "CANCER"?

A new pesticide situation has arisen. A hospital at Buffalo, N.Y., reports that a great number of patients are coming to them with precancer lesions, caused by arsenic in insecticides. Some patients were exposed as long as ten years ago, they say.

'Withered Hand' On Labels

A picture of a withered hand on a package label may soon tell transportation and chemical industry workers throughout the world that the container holds dangerously corrosive chemicals, just as the familiar skull and cross bones warns of poisonous contents.

Representatives of 88 Free World governments favored adoption of uniform pictorial symbols to mark containers of five classes of dangerous substances common to international shipping.

The reports were presented at a meeting of the Chemical Industries Committee of the International Labor Organization, a United Nations agency.

As a method of overcoming language barriers, most of the governments also favored a set of picture symbols to represent other common hazards.

Coffee Swap For Plant Food

India's coffee board is exporting 2,000 tons of coffee in exchange for fertilizer from Communist East Germany.

Weather Major Discussion Subject

Ideas on getting agriculture and weather information closer together were exchanged February 26 at the Delta Branch Experiment Station, Stoneville, Miss.

Extension and research workers, farmers, communication workers, U. S. Weather Bureau officials, and others interested in the dissemination and use of weather forecasts in agriculture attended the meeting.

Dr. W. L. Giles, superintendent

of the Delta Branch Experiment Station, opened the program by relating weather to different phases of cotton production. Two Mississippi county agents, R. P. Lewis of Clarksdale and M. E. Hill of Belzoni, discussed weather information in a county agricultural program.

J. S. Dollahite, Lake Cormorant, Miss., told how he applies this information to his farming operations. He was followed on the program by Derek Rooke, farm director of WMC and WMC-TV, Memphis, who described the part a farm broadcaster can play in disseminating weather forecasts.

The workshop was sponsored by the National Cotton Council in cooperation with the Delta Council, U. S. Weather Bureau, Mississippi Extension Service and the Delta Branch Experiment Station.

COASTAL—

(Continued from page 24)

and constructed by The Fluor Corporation of Los Angeles. The plant will produce wet process phosphoric acid in the unique St. Gobain reactor system. The ammonium phosphate facilities are designed for 350 tons per day of high analysis granular fertilizer.

The off-site facilities designed by Coastal Chemical consist of dock facilities for receiving raw materials and shipping some finished products by water, an "A" Frame type storage building for receiving and storing 10,000 tons of Florida phosphate rock, a rock grinding plant, approximately 15,000 tons of bulk and bagged fertilizer storage plus bulk and bagged material handling facilities.

Coastal expects to have one of the most modern fertilizer plants in the United States and as completely integrated as possible. As previously reported here, a contract was recently let to the Chemical Construction Corporation for an anhydrous ammonia plant and construction was expected to get under way at once. Until the ammonia plant is completed, Coastal's ammonia will be furnished by its parent company, Mississippi Chemical Corporation, at Yazoo City, Mississippi, where Coastal Chemical Corporation's main offices also are located.

OBITUARIES

Bart J. O'Hearn, western district sales manager of Union Bag—Camp Paper Corporation's multiwall bag division, died of a heart attack January 22 in Denver, Colorado.

CLASSIFIED ADVERTISING

For Sale, Exchange and Wanted Advertisements, same type now used, EIGHT CENTS a word for one insertion; TWELVE CENTS a word for two insertions; FIFTEEN CENTS a word for three insertions, and FOUR CENTS a word for each insertion more than three; ADVERTISEMENTS FOR THIS COLUMN MUST BE PAID IN ADVANCE.

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